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September 18, 1961

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Handley Page 115
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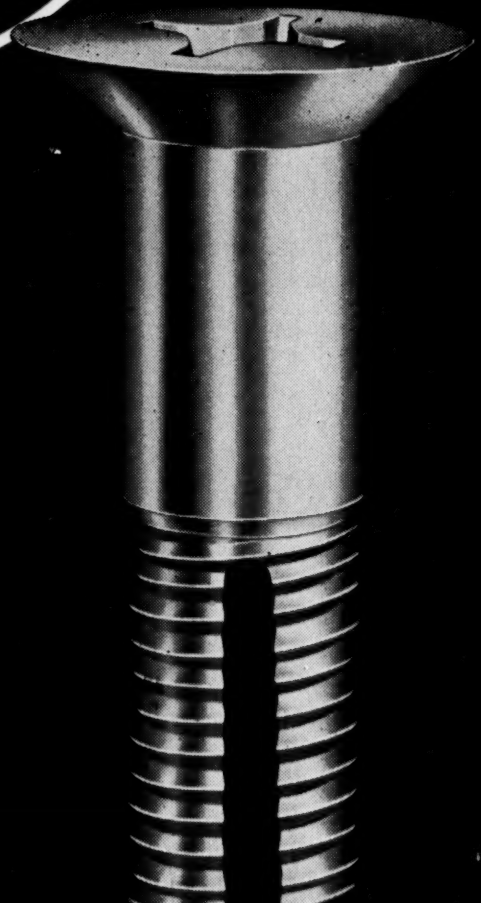

AVIATION CALENDAR

Sept. 26—14th New York State Aviation Development and Operation Conference, Hotel Utica, Utica, N. Y.
Sept. 26-28—Annual Convention, National Business Aircraft Assn., Mayo Hotel, Tulsa, Okla.
Sept. 29-30—Society of Experimental Test Pilots' Fifth Annual Symposium and Awards Banquet, Beverly-Hilton Hotel, Beverly Hills, Calif.
Oct. 2-4—Seventh National Communications Symposium, Institute of Radio Engineers, Hotel Utica, Utica, N. Y.
Oct. 2-5—Annual Meeting, Meteorological Committee, Air Transport Assn., Casa Munras Hotel, Monterey, Calif.
Oct. 2-7—12th International Astronautical Congress, Washington, D. C.
Oct. 3-5—National Airports Conference, University of Oklahoma, Norman, Okla.
Oct. 4-6—Semi-Annual Convention, American Society of Photogrammetry, Biltmore Hotel, New York, N. Y.
Oct. 4-6—Annual Convention, Federal Aviation Agency's Flight Service Specialists, Skirvin Hotel, Oklahoma City, Okla.
Oct. 5—International Airline Navigators Council, Pacific Regional Meeting, Hotel Drake Wiltshire, San Francisco, Calif.
Oct. 9-11—Mid-Year Conference, Airport Operators Council, Hilton Hotel, El Paso.
Oct. 9-11—National Electronics Conference, International Amphitheatre, Chicago, Ill.
Oct. 9-13—National Aerospace Engineering & Manufacturing Meeting, Society of Automotive Engineers, Ambassador Hotel,

(*Continued on page 6*)

AVIATION WEEK and Space Technology

September 18, 1961

Vol. 75, No. 12

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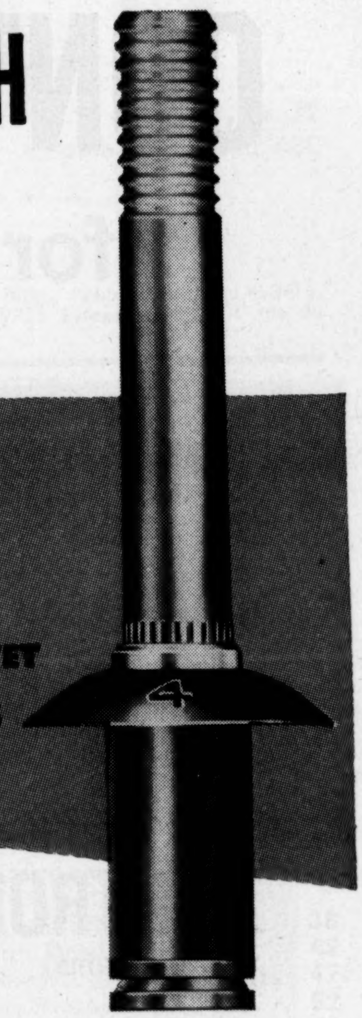

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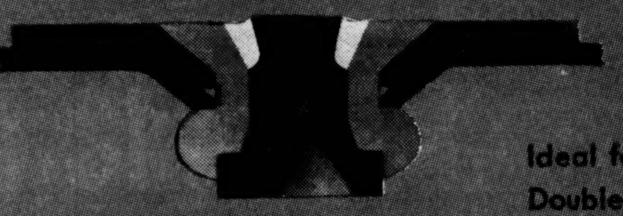

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AVIATION CALENDAR

(*Continued from page* 5)

Los Angeles, Calif.

Oct. 9-15—American Rocket Society's 16th Annual Meeting & Space Flight Report to the Nation, Coliseum, New York, N.Y.

Oct. 9-15—Aircraft Owners & Pilots Assn. Convention, St. Petersburg, Fla.

Oct. 10-12—Second Conference on Nuclear Reactor Chemistry and Fifth Conference on Analytical Chemistry in Nuclear Reactor Technology, Gatlinburg, Tenn. Sponsor: Oak Ridge National Laboratory.

Oct. 14—13th Annual Reunion, U. S. Naval Test Pilot School alumni, U. S. Naval Air Station, Patuxent River, Md.

Oct. 14-22—Federation Aeronautique Internationale 1961 General Conference, Hotel Quintandinha, Rio de Janeiro, Brazil.

Oct. 16-19—Eighth Annual Symposium, American Vacuum Society, and Second International Congress, International Organization for Vacuum Science and Technology, Sheraton-Park Hotel, Washington, D. C.

Oct. 19—General Aviation Safety Committee, National Safety Council, Conrad Hilton Hotel, Chicago, Ill.

Oct. 23-24—Joint Meeting, Canadian Aeronautical Institute/Institute of the Aerospace Sciences, Ottawa, Canada.

Oct. 23-24—International Airline Navigators Council, European Regional Meeting, Paris, France.

Oct. 23-25—East Coast Conference on Aerospace and Navigational Electronics, Institute of Radio Engineers, Lord Baltimore Hotel, Baltimore, Md.

Oct. 23-27—17th Annual General Meeting, International Air Transport Assn., Sydney, Australia.

Oct. 23-Nov. 3—William Tell 1961, USAF Interceptor Weapons Meet, Tyndall AFB, Fla. Host: Air Defense Command.

Oct. 24-26—Air Traffic Conference, Air Transport Assn., Marriott Twin Bridges Motor Hotel, Washington, D. C.

Oct. 24-26—International Symposium on Aero-Space Nuclear Propulsion, IRE, Riviera Hotel, Las Vegas, Nev.

Oct. 24-26—Air Transport Assn.'s Engineering and Maintenance Operators Meeting, Americana Hotel, Miami Beach, Fla.

Oct. 25-27—Annual Convention, Southeastern Airport Managers' Assn., Penn Hotel, Monroe, La.

Oct. 26-27—Quarterly Regional Meeting, Assn. of Local Transport Airlines, Sahara Hotel, Las Vegas, Nev.

Oct. 26-27—Third Annual Symposium on High-Speed Testing, Hotel Somerset, Boston, Mass. Sponsor: Plas-Tech Equipment Corp.

Oct. 30-Nov. 1—Annual Meeting, Air Traffic Control Assn., Deauville Hotel, Miami Beach, Fla.

Nov. 1-3—"Issues and Challenges of Air Transportation" Symposium, Hartford, Conn. Sponsor: Connecticut General Life Insurance Co.

Nov. 6-8—Special Technical Conference on Non-Linear Magnetics, Institute of Radio Engineers, Statler Hilton Hotel, Los Angeles, Calif.

Nov. 6-9—1961 Conference and AtomFair, Atomic Industrial Forum and American Nuclear Society, Conrad Hilton Hotel, Chicago, Ill.

September 18, 1961

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▶ NASA asks 37 firms to first bidders' meeting Sept. 26; two-contract project could be a billion-dollar effort.

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▶ Heads of most carriers accept invitation to discuss industry's steadily deteriorating economic situation.

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▶ Delivery of non-nuclear weapons and close-support gunnery assume new importance for USAF forces in Europe.

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COVER: Handley Page 115 delta research aircraft, photographed at the the 22nd annual flying display of the Society of British Aircraft Constructors, Farnborough, England (AW Sept. 11, p. 22) is designed to explore characteristics of the slim delta design in the critical low-speed landing regimes. Maximum speed is about 300 mph. This aircraft and a Fairey delta FD2 being rebuilt to evaluate the highly swept delta design at high speeds are part of a British study of supersonic transports in the Mach 2.2 range. See pp. 78, 79 for other photos of the HP 115 at Farnborough.

PICTURE CREDITS

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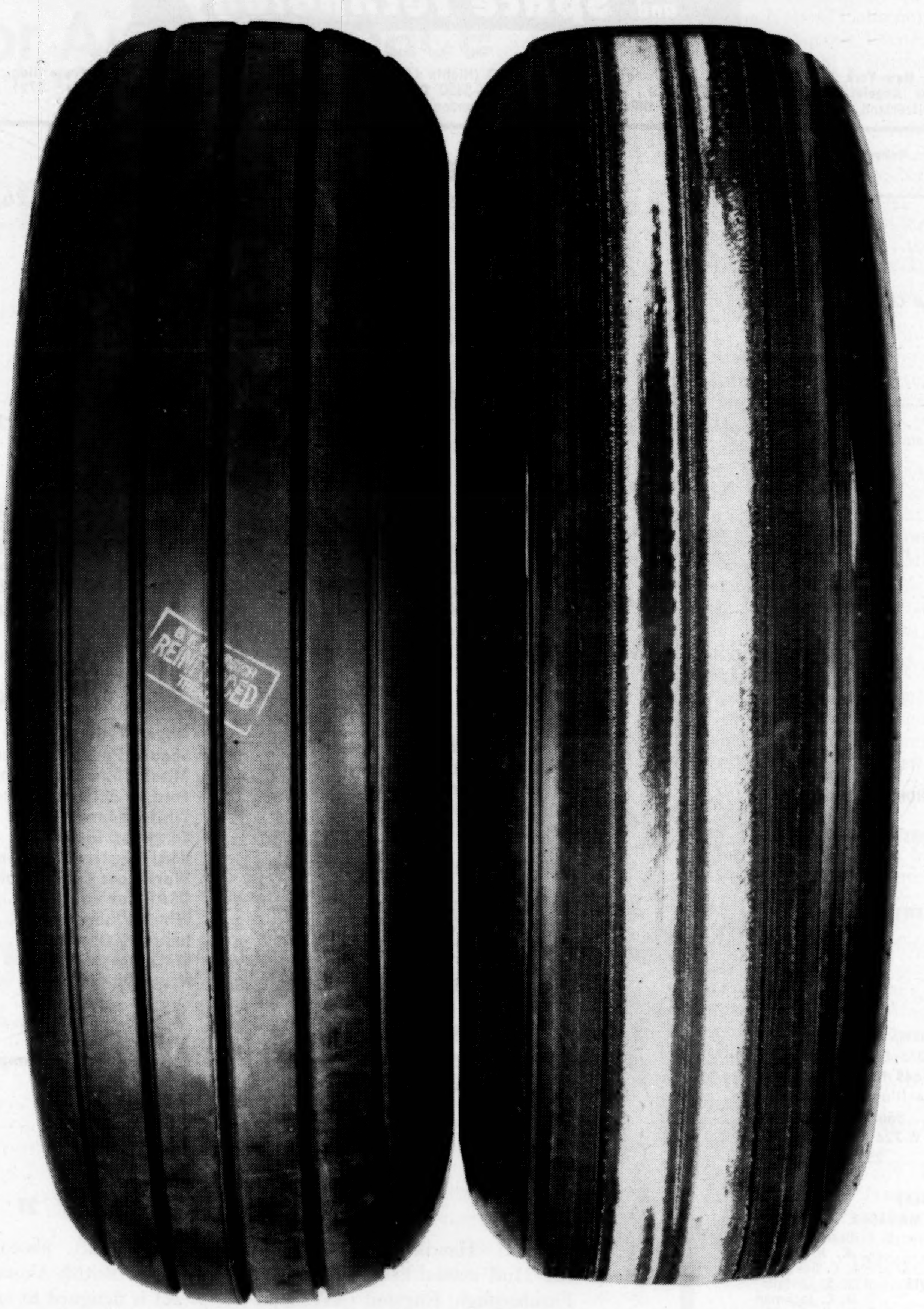

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EDITORIAL

The Military Space Role—II

We are at a critical crossroad in our national space program. The top political levels of our government are now convinced of the necessity for a vigorous, expanding national space program and are willing to provide it with adequate financial support. Even many of the original scientific skeptics who scoffed at the value of space exploration have changed their tune in light of space technology's achievements during the past few years and the portent for the future.

But unless this vastly expanded space program is properly organized and managed to meet all of the national requirements in space technology, both military and civil, it will hardly pay the proper future dividends that this vast investment should yield. There is not yet a clear indication that military space requirements are receiving more than cursory consideration at any of the top government levels that are absorbed in the problem of organizing and managing the new, expanded national space program. Defense Department representation on the joint policy groups handling liaison with the National Aeronautics and Space Administration is composed of personnel only remotely in touch with the military organizations which have developed major space technology capabilities and are wrestling with future requirements. As a result the work of these joint DOD-NASA committees has been largely concerned with the amount of support in skilled personnel, facilities and hardware the military must provide for NASA programs.

The National Space Council which was organized specifically to handle this problem has no adequate military representation nor has it shown any concern as to whether the national space program will meet military as well as civil space requirements.

Technological Divergence

There are vastly diverging requirements between military and civil space technology. For example, the NASA Mercury program has been concerned solely with simple ballistic re-entry for its manned orbital capsules. While this may provide a large amount of interesting scientific data, it represents a technical dead end from the viewpoint of military re-entry requirements where the primary consideration must be the ability to re-enter and reach a pre-selected point on earth—either a target or landing facility. A far broader exploration of the entire range of re-entry techniques and problems, including extremely high velocity re-entry speeds, will be required to lay the proper research foundation for military applications.

Yet there is very little in sight along this line in the current NASA programs, and even the USAF Dyna-Soar program which aimed in this direction is currently stalled in the top Pentagon decision-making bayous.

Bioastronautics is another area where military and civil requirements diverge. NASA has had to rely about 95% on the existing military capability in this field to support its Mercury program but is blocking any continued military development of this existing bioastronautics capability while it maneuvers to build its own technical empire in this area. Both technology and the taxpayer are bound to suffer if this trend prevails.

There is much work to be done in the whole area of orbital rendezvous, satellite docking, inspection, maintenance and spaceborne defense against hostile satellites before a sound technical foundation can be laid for effective military satellite defense systems. Yet NASA has little interest and practically no requirement in this area for its scientific explorations although it may belatedly generate some interest in this field to forestall any military criticism.

Unified Effort Required

The basic problem we are facing in the organization and management of the expanding national space program is not a simple issue of military versus civil control or requirements. There are not sufficient technical resources in space technology available now—nor are they likely to be available in the critical period of the future—to construct two separate space establishments duplicating each other. The problem resolves itself into using the available resources, both civil and military, and the resources that will become available from the expanding space budget to organize a truly national program that is designed to meet military and civil requirements and to pave the way for a successful exploitation of space in both areas. As matters stand now, the most important and urgent area of space technology—the military requirements—is being neglected and subordinated to the less vital and less urgent requirements of civil scientific exploration.

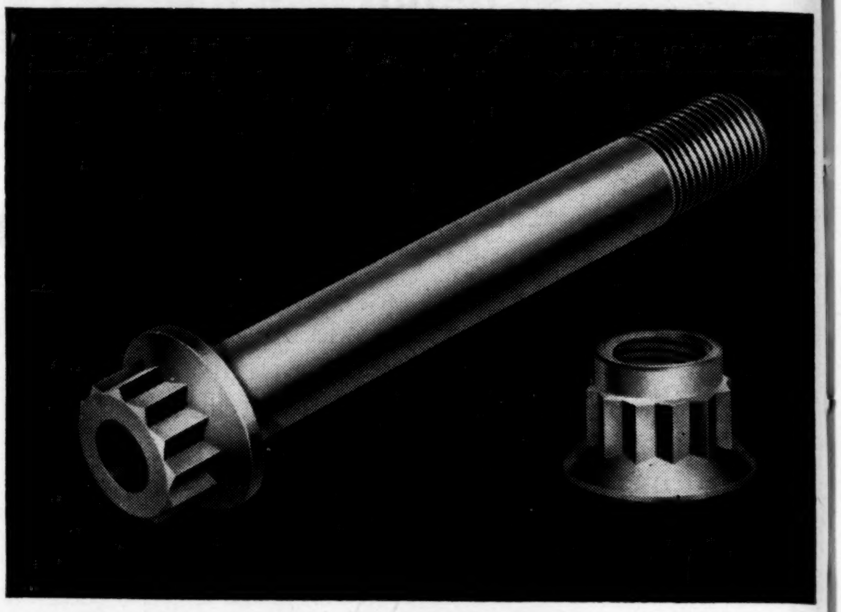
In the world in which we live today, where the challenge of the Soviet Union is growing in every area of military technology, it makes little sense to subordinate increasingly urgent requirements for military space capability to goals which have less bearing on our ultimate survival. The shadow of a growing Soviet military space capability already lies across our land.

The time to change our space policy is now. If we wait until Soviet space weapons confront us or until somebody in the Pentagon E Ring can write specific military space systems requirements we will again be too late and we will present the Soviets with an area of increasing military vulnerability across the entire spectrum of space technology.

—Robert Hotz

300,000

psi



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(Continued on page 99)

INDUSTRY OBSERVER

► Requests for proposals for a systems feasibility study for Aerospace Plane, a vehicle which would fly from earth to orbit and return, are expected to be issued by USAF before the end of this year.

► First launching of a boilerplate Apollo spacecraft is tentatively scheduled for 1963 aboard the seventh Saturn vehicle. Largest team among the two separate companies and three teams bidding probably is the one headed by McDonnell. It has Lockheed's California Division for the service module; Ling-Temco-Vought for the command module; Hughes for communications and displays; Minneapolis-Honeywell for controls; Northrop's Nortronics Division for guidance production, and the Radioplane Division for recovery apparatus, and Garrett's AiResearch Division for capsule life support system.

► Watch for Air Force to order four Lockheed C-130B turboprop transports for delivery to Pakistan. Pakistani Premier Ayub Khan claimed during his recent visit to the U. S. that his nation was the West's only trustworthy ally in the Middle East. He also is receiving Lockheed F-104 jet fighters and Sidewinder missiles through the U. S.

► United Aircraft Corp. has offered to buy the Middletown, Conn., nuclear aircraft engine laboratory from USAF. Although research by United's Pratt & Whitney division directed toward aircraft engines, has been greatly reduced since the cancellation of the Aircraft Nuclear Propulsion project, United apparently sees promise in its liquid metal reactor system, possibly for seaborne or commercial application.

► Decision is expected by Oct. 1 in the Advanced Research Projects Agency-Air Force competition for an over-all contractor manager for Vela Hotel, the project aimed at detection of nuclear blasts in space (see p. 31). Approximately a dozen companies submitted proposals in mid-August. They included General Dynamics/Astronautics, Space Technology Laboratories, Space General Corp., Raytheon and Bendix. Atlas-Agena B vehicle will be used to orbit two experimental payloads.

► Army hopes to complete evaluation of proposals for development of its Field Army Ballistic Missile Defense System (Fabmids) by the end of September. Six firms which headed teams working on funded Phase I studies have all bid for development. They are General Dynamics/Astronautics, General Electric, Hughes, Martin, Raytheon and Sylvania.

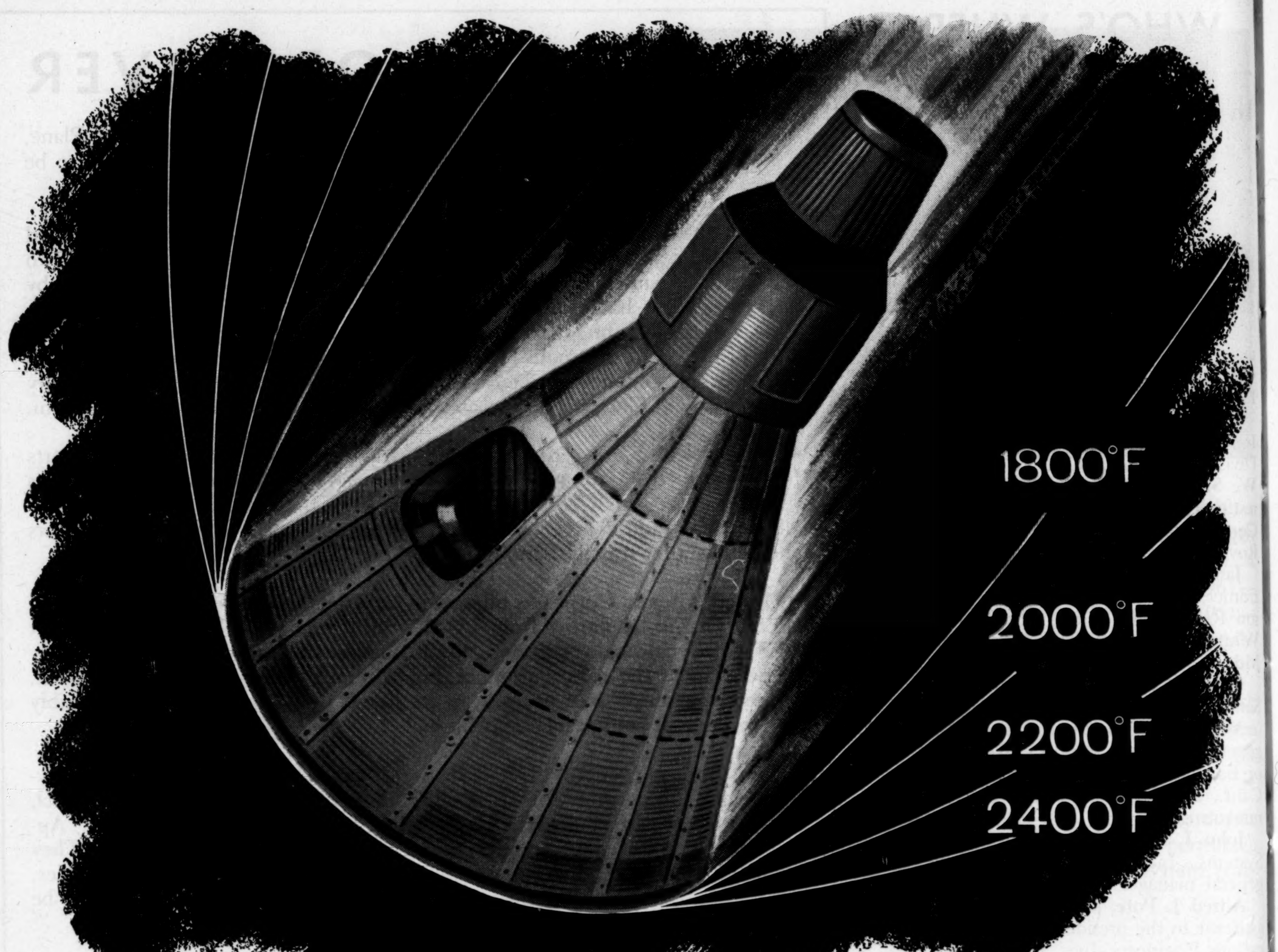
► Request for industry proposals on System 477-L, the Nuclear Detection System (Nudets), were scheduled to be sent out by Air Force Electronics Systems Division last week (AW Sept. 4, p. 23). ESD also plans to procure several extremely large phased-array type of radars for space surveillance and tracking as part of Air Defense Command's Space Track System (496-L).

► Lockheed C-130E, long-range version of the C-130 ordered by Military Air Transport Service, has been flown successfully at its maximum design weight of 155,000 lb. Flight, conducted at the Georgia Division, lasted 1 hr. 58 min. (see photo p. 72).

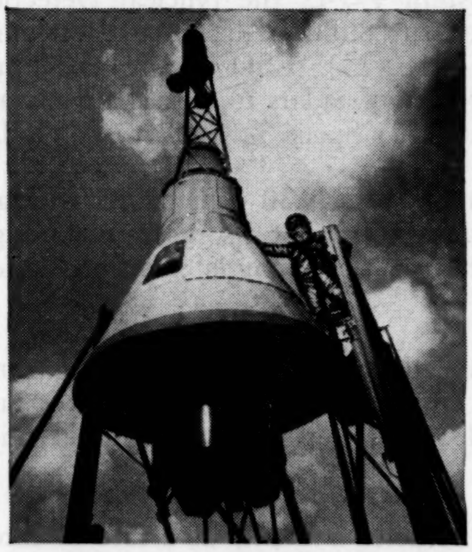
► Northrop Radioplane Division's Glide-Sail parachute is undergoing wind tunnel tests at National Aeronautics and Space Administration's Ames Research Center. Tests began Sept. 11. Drop tests are to begin in mid-October at Edwards AFB.

► USAF plans to launch 18 Discoverer vehicles annually at a rate of three launches every two months. Time between launches averages 22 days—5 days for assembly of the vehicle, 14 days on the pad and three days to rehabilitate the pad for the next shot.

► Czechoslovakia is developing a tilt-wing passenger aircraft of Czech design. Tests on a small model are under way now. Wing, piston engines and propellers are in the vertical position at takeoff and make the transition to horizontal for forward flight.



When this Mercury falls—temperatures soar!



Project Mercury engineer, in an Astronaut's pressure suit, with prototype HAYNES alloy-clad space capsule.

Whirling into re-entry from outer space, NASA's Project Mercury manned orbital space capsules must face a violent temperature rise. To protect the rear body walls from the terrific heat—plus violent erosive forces of the air—two alloys, produced by Haynes Stellite Company, were among those selected by the capsule builder. Rolled into thin sheet, these alloys dissipate the frictional heat by radiation outward into space—even as they maintain ample structural strength and outwit erosive attack.

HAYNES alloys that resist temperatures of over 2000 deg. F.—for long periods and under great stress—today serve in many hot spots. Resistance to stress, thermal shock, erosion, corrosion, and fatigue makes these alloys extremely useful in jet engine turbine wheels, in ramjets, missiles, rockets, and manned space capsules.

Whether investment- or sand-cast, rolled, wrought, vacuum melted, or air melted, there's a HAYNES high-temperature alloy to meet your needs.

HAYNES
ALLOYS
HAYNES STELLITE COMPANY
Division of Union Carbide Corporation
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UNION CARBIDE

Address inquiries to Haynes Stellite Company
270 Park Avenue, New York 17, New York

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Washington Roundup

Bomber Decision

Decision on whether to spend $694.5 million extra voted by Congress for purchase of B-52 bombers and to increase the B-70 program to full weapon system status is awaiting action at the White House. There are indications that Defense Secretary Robert McNamara continued to oppose spending the money when he forwarded his recommendations to the President. Mr. Kennedy now faces the choice of overriding McNamara or inviting trouble on Capitol Hill. He may wait until Congress leaves town to reveal his decision.

Army's purchase of 200 more light helicopters from Hiller for $6,639,880 raises still another question about Air Force Secretary Eugene Zuckert's recent premature announcement that the Vought-Hiller-Ryan team was favored for the tri-service VTOL contract. This caused a furor in the Secretary of Defense's office, partly because it was a one-service announcement on a tri-service project, and partly because current practice is to try to spread defense business around as much as possible. Whether the Army-Air Force recommendation for the Vought-Hiller-Ryan team will be accepted is still uncertain.

Aeronautical Research

Despite the recent clamor for more aeronautical research by government, climaxed by Project Horizon's call for a senior technical group within National Aeronautics and Space Administration to direct aviation development, NASA Administrator James E. Webb is showing no inclination to create a top-level aeronautical office.

In the NASA reorganization now being worked out, Webb wants to move away from what he considers compartmentalization of research activities. NASA has said frequently that it is keeping up with the state of the art in aeronautics and meeting requirements of the military services and airframe manufacturers. It points out that NASA spent several hundred man-years in research on the B-70 program, which has only mild Pentagon support, and has several dozen potential designs for a supersonic transport, an innovation for which the airlines have shown little enthusiasm.

Gen. Earle E. Partridge, USAF (ret.), a trustee of Aerospace Corp., is heading the committee that is preparing plans for the national command and control system (AW Sept. 11, p. 21) requested by President Kennedy. Maj. Gen. L. G. McCallom is directing one of the committee's task forces.

Assault on Records

Specific plans for an all-out assault on world aviation records are being made by National Aeronautic Assn., Air Force, Army, Navy, Federal Aviation Agency, NASA and civilian organizations. Maj. Gen. Al Boyd, USAF (ret.), is heading a committee that is determining what records can be captured without diverting aircraft from more important missions. It met for the first time Sept. 6. Harold Mahlman, secretary of NAA's contest board, is coordinating the work. U. S. holds 115 of the 422 Federation Aeronautique Internationale records and Russia 105.

Since someone computed the cost of sending Cdr. Alan B. Shepard on his ballistic space flight at $2.23 for each U. S. citizen, NASA has received about 70 gifts for that amount. Its charter allows the agency to keep any gift so long as it carries no stipulation. In the past several months, NASA has turned $750 over to the Treasury Department from unsolicited contributions toward the space effort. NASA will use the money but has spent none of it so far.

Convention Problems

Air Force Assn.'s cancellation of plans to hold its Second World Congress of Flight next September have worsened NAA's chances for sponsoring the FAI convention and world aviation championships in the U. S., which were to have been held at the same time. Defense Department objected to one congressional bill that would have diverted $450,000 in defense funds to NAA for that purpose, and neither Defense nor State Department has yet advised the Senate Foreign Relations Committee of its views on a similar bill.

NAA must know by Oct. 13 whether it will get the money because invitations must be issued. AFA cited the world situation as its reason for indefinite postponement of the Congress, but lack of progress with the NAA bill and the recent decision not to allow manufacturers' exhibits as an allowable contract cost undoubtedly contributed. AFA's 1962 convention and Aerospace Panorama will be held as scheduled.

Attrition in the selection of Navy aviators for promotion from commander to captain has become so severe because of the great number of officers commissioned early in World War II that a recent promotion list included only 50% of the academy graduates and 20% of the non-academy fliers.

Pentagon's newest security classification, used only in conversation and never on paper, is "confidential with a small c." It means, "What I'm about to tell you doesn't affect national security but if you attribute it to me, I'll deny it."

—Washington Staff

Saturn Booster Awards Are Due This Year

NASA asks 37 firms to first bidders' meeting Sept. 26; two-contract project could be a billion-dollar effort.

By Edward H. Kolcum

Washington—Contracts to build and test two Saturn booster configurations, which could grow into a billion-dollar effort, will be awarded to two separate contractors before the end of the year by the National Aeronautics and Space Administration. A conference for 37 prospective bidders for the S-I booster stage will be held in New Orleans Sept. 26, and a similar conference on the S-IB stage is being scheduled in October.

Bidders this week will inspect government-owned plant facilities at Michoud, La., where both boosters will be fabricated.

Bids for the S-I project will be due Oct. 16 and will involve assembly of the eight-engine booster stage. NASA late last week decided that S-I and S-IB projects will be a split procurement, meaning that they will be awarded under separate contracts. Winners will jointly occupy the Michoud plant. The S-IB is a cluster of two 1.5-million-lb. thrust Rocketdyne F-1 engines.

NASA last week awarded a $140-million contract to Space and Information Systems Division of North American Aviation, Inc., for development of the S-II Saturn stage and production of 10 S-II vehicles. The S-II, a cluster of four Rocketdyne J-2 engines, will be the second stage of the Saturn C-3 launch vehicle, which will use the S-IB cluster as booster.

NASA's Marshall Space Flight Center at Huntsville will assemble the first 11 S-I boosters and the winner of the booster contract will begin production with the 12th vehicle. Marshall also is doing the preliminary design work for the S-IB stage, and probably will fabricate one static test model. Under the present plan, the contractor who wins the Saturn booster contract will complete design and development of the S-IB, and produce all flight boosters.

Michoud Selected

The agency recently selected Michoud as the site for both S-I and S-IB booster production (AW Sept. 11, p. 30), and this site may also be used for assembly of the liquid-propellant Nova launch vehicle—a cluster of eight F-1 engines producing a total thrust of 12 million lb. The plant will be operated by the winner of the booster competition, under the executive management of the Marshall Center.

Award of the booster contract will place all Saturn hardware components with industry. The Saturn program now consists of these two vehicles:

- **C-1: the S-I booster** topped by a Douglas S-IV stage, consisting of a cluster of six Pratt & Whitney RL-10-A3 engines. The booster is a cluster of eight Rocketdyne H-1 kerosene-oxygen engines, each producing 188,000 lb. thrust, for a sea level thrust rating of 1.5 million lb. The S-I is 21.6 ft. in diameter and 82 ft. high. The S-IV, which produces 90,000 lb. thrust in a vacuum, has 17 ft. dia., is 40 ft. high.
- **C-3: the S-IB booster** plus the North American S-II second stage and the Douglas S-IV third stage. This configuration is designed to place 80,000 lb. into a 300-mi. earth orbit, 30,000 lb. on an escape trajectory or 20,000 lb. on a Mars or Venus trajectory.

Several other Saturn configurations are under study, but C-1 and C-3 are the only versions approved. Plans for a C-2 configuration—an S-I booster with an S-II second stage and S-IV third stage—have been scrapped. Studies are being made on a C-4 vehicle, based on a booster of four F-1 engines (AW Aug. 28, p. 30), and a solid propellant version paralleling the C-3.

NASA feels that from a timing standpoint, the solid-fueled Saturn cannot compete with the liquid propellant version, but that a competition exists "further down the road"—between liquid and solid Nova vehicles. Air Force is developing the solid-propellant Nova to NASA's specifications.

Rendezvous Approaches

Meanwhile, NASA Administrator James E. Webb indicated last week that orbital rendezvous of vehicles is being considered as an alternative to direct flights for putting payloads on the moon. If rendezvous appears feasible, the Saturn C-1 and C-3 launch vehicles loom as major payload carriers in U. S. moon landing and interplanetary flight programs. If it is not feasible, major missions will have to wait for Nova.

Dr. Arthur Kantrowitz of Avco Corp., writing in Aviation Week (Sept. 4, p. 60), said an orbital assembly program could result in a manned space station in two to three years.

There currently are at least five distinct techniques under study in the rendezvous field:

- **Earth orbit assembly,** in which a lunar or planetary spacecraft would be assembled by launching multiple payloads, to be joined while in a 300-mi. orbit.
- **Lunar rendezvous and assembly,** for interplanetary flights. Multiple payloads would be launched directly to the moon, assembled there and launched to the planets.

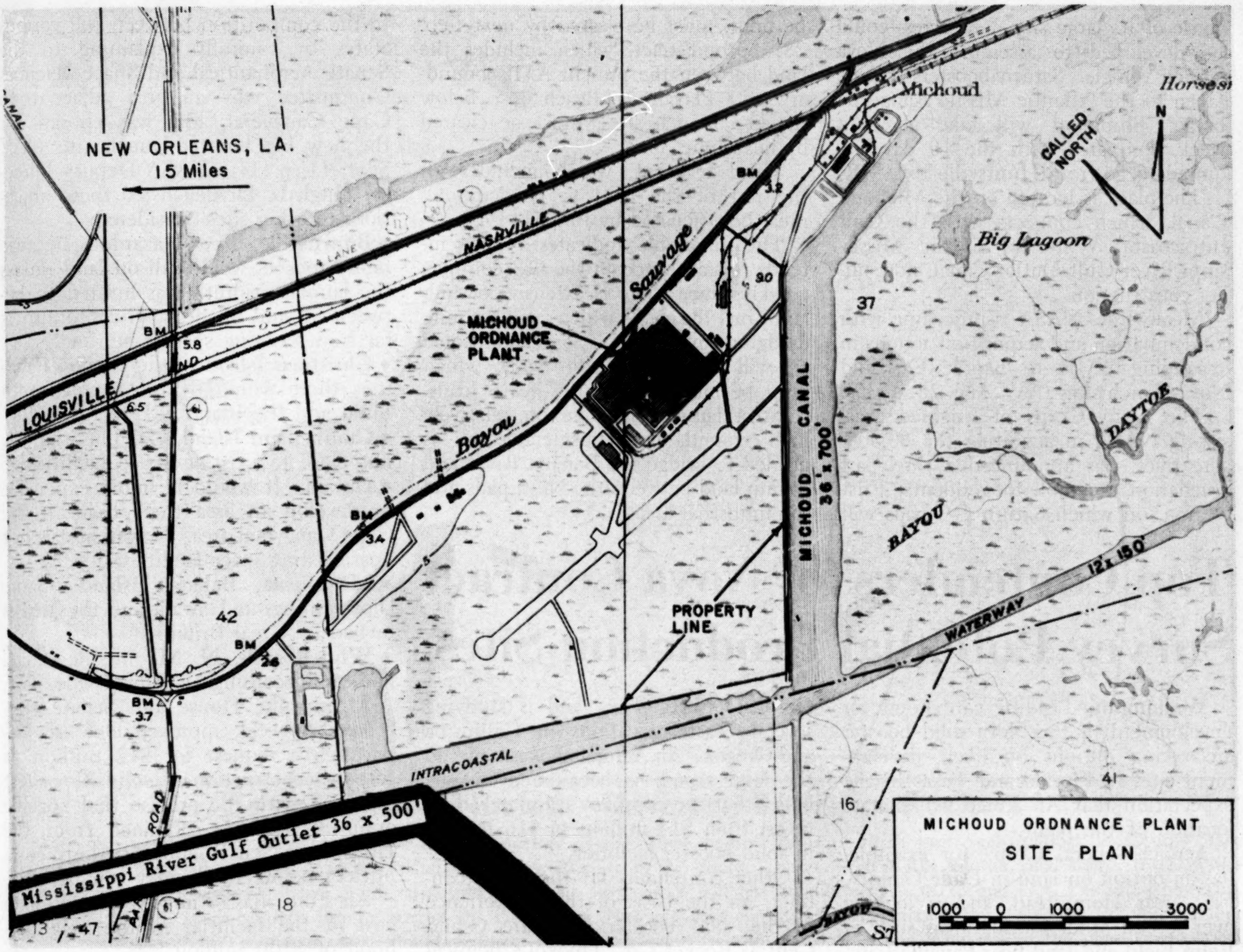
Prospective Saturn Bidders Listed

Washington—Competition for the Saturn booster contract has long been awaited by the aerospace industry (AW Sept. 4, p. 25), and it marks the first in which the automobile industry is making a strong bid to enter the large launch vehicle market.

Companies which have been invited to the bidders' conference, to be held Sept. 26 in New Orleans, La., will be briefed on the project, plant facilities of nearby Michoud where Saturn boosters will be fabricated, and on the area. Louisiana state officials will attend the briefing.

The National Aeronautics and Space Administration last Friday invited the following firms to inspect Michoud facilities this week, and to attend the Sept. 26 bidders' conference:

Aerojet-General Corp.; American Machine & Foundry Co.; Avco Corp.; Beech Aircraft Corp.; Bell Aerosystems Co.; Bendix Corp.; Boeing Co.; Brown Engineering Co.; Chance Vought Corp.; Chrysler Corp.; Douglas Aircraft Co., Inc.; Firestone Tire & Rubber Co.; Ford Motor Co.; General Dynamics Corp.; General Electric Co., Inc.; General Motors Corp.; General Precision Equipment Corp.; Goodyear Aircraft Corp.; Grumman Aircraft Engineering Corp.; Hayes Aircraft Corp.; Hughes Aircraft Co.; Kaiser Industries Corp.; Lockheed Aircraft Corp.; Martin Co.; McDonnell Aircraft Corp.; Minneapolis-Honeywell Regulator Co.; North American Aviation, Inc.; Northrop Corp.; Raytheon Co.; Republic Aviation Corp.; Ryan Aeronautical Co.; Sperry Rand Corp.; Sylvania Electric Products, Inc.; Temco Electronics & Missiles Co.; United Aircraft Corp.; Western Electric Co., Inc., and Westinghouse Electric Corp.



MICHOUD ORDNANCE PLANT, inactive since shortly after the Korean War, is located in Louisiana at the confluence of the Michoud Canal and the Louisiana Intracoastal Waterway, about 15 miles from New Orleans. Plant could produce two S-I boosters a month.

- **In-transit rendezvous and assembly,** where payloads would be launched in quick succession from the earth, joined together between the earth and the moon, where the lower pull of gravity lessens the rendezvous problem, and landed on the moon as a larger vehicle than may be launched in one shot.
- **High-orbit assembly,** similar to the 300-mi. orbit except that the apogee would be several thousand miles, where the effects of gravity are low. Advantage of this system over the in-transit method is the opportunity to try again if the target is missed at first.
- **Refueling in an earth orbit,** in which tankers would rendezvous with a mission module, for both lunar and planetary flights.

Some scientists are convinced that rendezvous and assembly in orbit or in transit is the only way to leapfrog the Soviet Union in space exploration. A NASA Marshall Center study concludes that from timing and economic standpoints, Saturn vehicle rendezvous is more attractive than direct ascent. Air Force Systems Command is developing rendezvous, docking and sealing techniques. AFSC's Space Systems Division has a requirement for these operations in its Saint satellite interception-neutralization program.

Rendezvous would give an increasingly important role to the Saturn C-3, which was originally conceived as the vehicle to carry the Apollo spacecraft into a circumlunar orbit. This vehicle will be about 200 ft. tall, including the Apollo payload, and its stages will have these characteristics:

- **Booster—S-IB,** a 2.4-million-lb. liftoff weight, with 3-million-lb. sea level thrust. Specific impulse of the kerosene-oxygen fuel is 260 sec. at sea level. Propellant weighs 1.5 million lb., and the structure about 900,000 lb.
- **Second stage—S-II,** with a weight of 786,500 lb., of which 550,000 lb. is the hydrogen-oxygen propellant. Thrust in vacuum is 800,000 lb., and specific impulse 422 sec.
- **Third stage—S-IV,** with a weight of 190,000 lb., of which 158,200 lb. is hydrogen-oxygen propellant. Vacuum thrust is 90,000 lb., and specific impulse 420 sec.

Work statement for the S-I and S-IB stages is now being prepared by NASA, and is expected initially to call for following the same procedures as are being followed by Marshall in fabrication. Major components already are under contract for S-I, and the job essentially is one of assembly, rather than manufacture of airframe parts.

NASA will leave open the possibility of the winner eventually building his own major components, but initially it will specify use of existing suppliers.

The Michoud facility is expected to go into operation within a year.

First Saturn C-1 launch with a live S-I stage and dummy S-IV stage is scheduled for next month. Two similar configurations will be launched next spring and fall.

Live booster and second-stage launches will begin in 1963, under the present schedule. The P&W RL-10-A3 engine is the controlling item in this schedule, as it is in the schedule for the Centaur launch vehicle (AW Sept. 4, p. 26). Centaur has slipped at least nine months because of a series of engine development problems, but NASA feels this slippage will not affect the Saturn schedule.

The Michoud complex will include several new static test facilities, and because of its large size—846 acres—could be developed to assemble the Nova launch vehicle. Saturn boosters will be taken to the Atlantic Missile Range by barge. Shipment will take about a week, compared with the 10 days required to go from Huntsville to AMR.

The plant is located on the Michoud Canal, which connects with the Gulf Intracoastal Waterway to the Mississippi River Gulf Outlet Canal, now under construction.

Meanwhile, NASA is proceding with condemnation and acquisition actions in expanding AMR to handle C-3 and Nova launch sites (AW Aug. 28, p. 30).

The Army Corps of Engineers, assisting NASA in acquiring the 80,000-acre tract, has announced a three-part evacuation timetable for residents. First section, on which Saturn C-3 pads will be built, must be cleared by next Feb. 28. Second tract, which includes the land between the present AMR boundary and Playalinda Beach just below the C-3 launch sites, must be cleared by next June 30.

Third segment, which includes all the rest of the land to be acquired, must be evacuated by July 31, 1963.

This timetable indicates NASA intends to start work on the C-3 complex quickly, since there is extensive swamp land on the site which will require dredging and filling. Some additional fill will be required for roads, which must be built to take the heavy loads.

Nova launch sites are on relatively high ground, but considerable fill is needed to bridge the Banana River and swamp land between the Nova pads and the industrial area.

Top Contenders for Nova Contract Survey Potential Production Sites

Washington—Leading contenders for development of the Nova solid booster are taking options on likely development sites in Florida and Texas in the expectation that Air Force will dictate location of the plant.

Aerojet-General Corp., for example, has an option on land in Dade County, Fla., near Homestead, and is looking over several other Florida areas such as Eglin Field and land near Panama City.

Aerojet also has options on land near Corpus Christi, Tex., and is studying several coastal locations in California and Oregon. An Aerojet spokesman said the land search is occasioned by the belief that the company ultimately may invest from $14 million to $16 million in solid booster facilities.

Other contenders for the Nova contract, on the basis of their experience in the solid booster field, are Grand Central Rocket Co., Thiokol Chemical Co. and United Technology Corp. All those firms, directly or indirectly, have rights to Florida property or are negotiating for them.

Most of the firms also are vigorously seeking coastal property in other states. Access to the sea is a key requirement for solid booster facilities. A spokesman for Thiokol said the firm was looking over the whole southeastern coastal area. Company leaders believe having rights to land in areas will improve their chances of winning the Nova contract.

Sen. George A. Smathers (D.-Fla.), who is anxious for the solid booster plant to be located in his state, told Aviation Week he is optimistic about Florida's chances.

Pressure also is being exerted on the National Aeronautics and Space Administration from states who are bidding for its Manned Space Flight Laboratory. Right now, all signs point to the selection of Houston, Tex., which is favored by such influential officials as Vice President Lyndon Johnson and Rep. Albert Thomas (D.-Tex.), chairman of the House appropriations subcommittee which handles NASA's budget. However, there have been renewed pressures to put the space laboratory in Massachusetts and Florida.

NASA recently showed its sensitivity to the competition between the various states by carefully explaining to the Senate Aeronautical and Space Sciences Committee why an area adjacent to Cape Canaveral, Fla. was chosen for the new big booster launch site (AW Sept. 11, p. 33). NASA Deputy Director Hugh L. Dryden listed these objections to other sites considered:

- **Brownsville, Tex.** Hazardous because faulty rockets would fall on land unless the launch azimuth was limited to between 80 and 90 deg. The site also is far from existing space facilities.
- **Christmas Island** in the Pacific. Facilities there would be too expensive to build and the island is U. N.-owned.
- **Cumberland Island, Ga.** The island is not close to existing space facilities.
- **Hawaii.** It would be more expensive to develop an area there than in the Cape Canaveral area. Hawaii also is not near existing space facilities.
- **Mayaguana, Bahama Island.** Same shortcomings as Hawaii, and the area is owned by Great Britain.
- **White Sands, N. M.,** missile range. Same shortcomings as Brownsville, Tex.

Meanwhile, House and Senate conferees last week approved Defense Department's request for $12 million to initiate construction of solid Nova test facilities, with the proviso that specific approval must be obtained from the House and Senate appropriations committees before the money can be used.

Air Force has estimated the ultimate cost of the facilities in the neighborhood of $100 million.

Conference Hope Ends

The U. S. office planning for the United Nations Conference on the Peaceful Uses of Outer Space will be disbanded Sept. 30, and its responsibilities will be absorbed by National Aeronautics and Space Administration's International Relations office.

The move follows about two years of fruitless attempts to establish a location, time and agenda for an international conference on space sponsored by governments. U. S. and the Soviet Union have been unable to agree on what nations would be represented as the international committee which would plan the conference.

It is expected that the U. S. staff, headed by Dr. John P. Hagen, will be reassigned to other scientific and administrative jobs within NASA.

A United Nations spokesman told Aviation Week that the space conference is on the provisional U. N. agenda, but since the conference committee has been inactive, it is expected that it will submit simply a "not met" report.

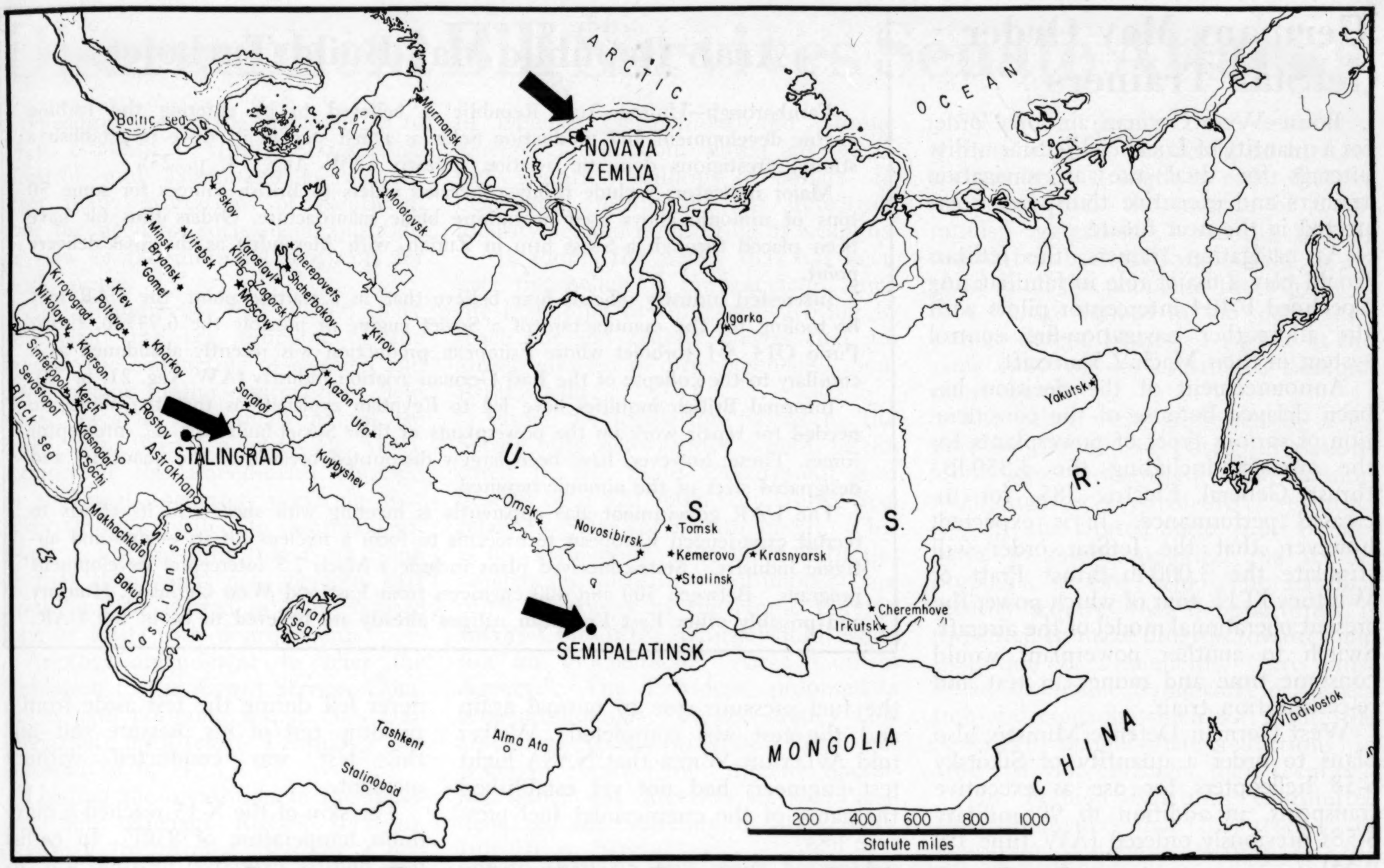
Global Surveillance System

Four parallel industry studies of global surveillance system, SR 178 (AW Feb. 27, p. 22) are being evaluated by USAF after a series of presentations were made last month to Aeronautical Systems Division. Indications are that there may be another round of industry studies of the system, which envisions earth-orbiting manned, maneuverable satellites performing reconnaissance functions.

The four studies already submitted constitute USAF-funded efforts conducted by North American Aviation and Martin and unfunded studies by General Electric and Boeing. If additional studies are conducted, or if the program is implemented, both its name and designation probably will be changed.

Concept of a manned satellite surveillance system has come under criticism within the industry, largely because of the high cost of including men in the system. Value of the human observer is not believed to justify costs, according to this industry view.

The Dyna-Soar is one of the vehicles regarded by USAF as suitable for global surveillance system use.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Soviets Test Nuclear Devices, Ballistic Rockets

By late last week, Soviet Russia had exploded ten nuclear devices since Sept. 1, four of them near Semipalatinsk in Central Asia, one east of Stalingrad and five near the island of Novaya Zemlya in the Arctic. Seven were in the kiloton yield range, three in the megaton range. All were exploded in the atmosphere. Russia also said it will test fire between Sept. 13 and Oct. 15 "more powerful, improved" ballistic space boosters into an area of the Pacific near Hawaii that is considerably smaller than the areas used last year for four test shots of some 8,000 mi. each. Soviet military forces are holding maneuvers in the Barents and Kara seas in the same time period. Marshal K. S. Moskalenko, commander of rocket forces, said Soviet ballistic missiles are "invulnerable to modern means of counter-action." There is some speculation that the explosions near Novaya Zemlya were warheads launched by rockets from sites inside Russia. House has approved $30 million for U. S. underground tests.

Nitze Predicts Series Of Moves by Soviets

Washington—It is likely that Soviet Russia will "try to force a series of Western withdrawals, no one of which would . . . require a clear-cut decision to go to war, yet in the aggregate would constitute a Western defeat," according to Assistant Secretary of Defense for International Security Affairs Paul H. Nitze.

The democracies have patience and forbearance, he told the annual convention of the Army Assn. of the United States, but there is a limit. "Any interference with our essential rights in Berlin must be viewed by us as the straw that broke the camel's back," he said.

Speaking of U. S. capabilities in conventional forces, he said that the ability to commit such forces "makes more credible to the USSR the certain prospect that we will back our non-nuclear forces by the use of our strategic capabilities should that be necessary."

The timing of the Russian announcement that it would resume nuclear weapons testing was a "calculated thumbing of the nose at the non-aligned nations in Belgrade," he said. "It said, in essence, 'we are strong, we are armed, we shall do as we please.'"

Nitze believes that the next 90 days and beyond may see the test that will decide which way the future of the world will go.

Meanwhile, in the Berlin area, there were reports that the East German air force may hold "maneuvers" in the air corridors to West Berlin to test allied determination to defend their rights to unrestricted air access.

East German officials stated that if a peace treaty is signed, East Germany will control the air above its territory. New air traffic arrangements "will have nothing to do with the rights of Western allies which were assumed for the occupation regime," they said.

West German Chancellor Konrad Adenauer said in a speech that East Germany was on the brink of rebellion when the Communists sealed off the East-West Berlin border Aug. 13.

In a continued buildup of European-based forces, the U. S. Army planned to send 40,000 more troops across the Atlantic. The Air Force dispatched 72 more North American F-100D Super Sabre fighter-bombers to Germany. Intensified training for air units in conventional warfare tactics was ordered. The Navy recalled an additional 1,957 Naval Air Reservists for service in active squadrons.

Samos III Explodes

Atlas-D booster of USAF-Lockheed Samos III reconnaissance satellite exploded on the pad at Naval Missile Facility, Pt. Arguello, Calif., shortly after engine ignition. An eyewitness reported that immediately after the engines started, the long flames in the flame bucket began to diminish again as if there had been an automatic shutdown. Then the rocket began to burn and there were three explosions in the flames. The countdown had been exceptionally clean.

Samos III was launched Sept. 9.

Germany May Order JetStar Trainers

Bonn—West German air force order for a quantity of Lockheed JetStar utility aircraft for dual use as navigation trainers and executive transports is expected in the near future.

As navigation trainers, the JetStars would play a major role in familiarizing Lockheed F-104 interceptor pilots with the all-weather navigation-fire control system in their Mach 2.5 aircraft.

Announcement of the decision has been delayed because of the consideration of various types of powerplants for the aircraft, including the 3,850-lb.-thrust General Electric J85, for increased performance. It is expected, however, that the JetStar order will stipulate the 3,000-lb.-thrust Pratt & Whitney JT12, four of which power the present operational model of the aircraft. Switch to another powerplant would consume time and money in test and re-certification trials.

West German Defense Ministry also plans to order a quantity of Sikorsky S-58 helicopters for use as executive transports, in addition to 90 military S-58s previously ordered (AW June 19, p.34).

Arab Republic May Build Turbojets

Farnborough—United Arab Republic is believed to be entering the turbine engine development and production fields as a first step in its drive to establish a strong, prestigious domestic aviation industry (AW Aug. 14, p. 23).

Major indicators include thinly concealed orders to British sources for some 50 tons of nimonic alloys used in turbine blade manufacture. Orders thus far have been placed through a Swiss firm in Zurich, with Alexandria as the final delivery point.

Interested industry officials here believe that, as a starting point, the UAR may be tooling for the manufacture of a Soviet engine or possibly the 6,945-lb. thrust Pirno O14 A-1 turbojet whose European production was recently abandoned as a corollary to the collapse of the East German aviation industry (AW Aug. 21, p. 72).

Informal British inquiries have led to Egyptian explanations that the alloys are needed for repair work on the powerplants of their Soviet-built MiG-17 interceptor forces. These, however, have been largely discounted because of the quantities and designated sizes of the nimonic required.

The UAR government also apparently is meeting with success in its efforts to recruit experienced European technicians to form a nucleus for its engine and airframe industry. State-conceived plans include a Mach 2.5 interceptor development program. Between 300 and 400 engineers from East and West Germany, Hungary and possibly other East European nations already are believed to be in the UAR.

X-15 Sets Record Of 3,645 mph.

Los Angeles—Drop in fuel pressure at the engine inlet caused NASA test pilot Joe Walker to throttle back to 50% thrust shortly after launch of the North American X-15 in a recent flight to a speed record of 3,645 mph.

The fuel pressure warning light came on shortly after the X-15 was released from the Boeing B-52 mother-ship over Beatty, Nev., at an altitude of 45,000 ft. When the engine was throttled back, the fuel pressure rose to normal again and the test was completed. Walker told Aviation Week that NASA flight test engineers had not yet established the cause of the engine inlet fuel pressure loss.

He said there was no trace of the cabin pressurization problem which formerly troubled the X-15. The environmental system was designed to pressurize the cabin with waste gaseous nitrogen boiled off from a liquid nitrogen supply to cool the avionic systems. The nitrogen required for this purpose proved to be less than anticipated and cabin leakage proved to be more than anticipated. Since flow rate at the cabin exit was uncontrolled, pressure would fall and the pilot's pressure suit inflated, making motion difficult. Since then, a pressure-sensing valve has been installed in the cabin exit to cut the outflow of gaseous nitrogen. Walker said pressure never fell during the test aside from a pre-drop test of his pressure suit—and this test was conducted without incident.

The skin of the X-15 reached a maximum temperature of 850F. In earlier test flights, excessive heating was reported along the wing surfaces due to friction from the turbulent boundary layer behind thermal expansion gaps in the wing leading edges. To prevent this the gaps were covered with flush Inconel caps. Walker said the 3,645-mph. flight proved them to be effective. This was the first time they had been tested at extreme speed; they had been tested once before at comparatively low performance levels.

Navy Training Unit Receives 5 HSS-2s

New York—First training squadron equipped with Navy-Sikorsky HSS-2 helicopters will begin operation at Ream Field, San Diego, Calif.

Five of the helicopters arrived there last week.

The twin-turbine, amphibious antisubmarine helicopter made what is believed to be the fastest crossing of the United States by helicopters, covering the 2,350-mi. distance from Key West to San Diego in approximately 18 flying hours.

Average speed of the helicopter was 132 kt.

The helicopters will be assigned to Helicopter Anti-Submarine Squadron 10, a fleet replacement training squadron based at Ream Field. Helicopter Anti-Submarine Squadron 2, also based at the field, will be the first operational squadron to receive the HSS-2. The aircraft will be the Navy's first all-weather helicopters.

NASA Plans 10-12 Man Space Station

Washington—Plans are being developed by the National Aeronautics and Space Administration for a manned space station "very much larger" than the Apollo spacecraft, according to James E. Webb, NASA administrator.

Webb said President Kennedy and NASA feel it is "inconceivable" that the U. S. will stop with the three-man Apollo craft. The next generation station will carry 10 to 12 astronauts, he said. NASA is considering this in selecting the site for its manned space flight laboratory "so we won't have to build it again in a few years."

Webb told the National Press Club here that 2,200 potential problem areas have been identified in the Apollo project, and they are now undergoing a third screening process. Among the major items in the manned lunar landing project are facilities—the launch complex at the Atlantic Missile Range (AW Aug. 28, p. 30); the Saturn fabrication site on Michoud, La. (AW Sept. 11, p. 30), and the site for the manned space flight laboratory, still to be selected

Webb predicted that the space program will cost $35 billion over the next 10 yr., and said 80% of this expenditure will go to industry and universities in contracts.

He said many early critics of the space program, such as Dr. Lee A. DuBridge, president of the California Institute of Technology, "are now having second thoughts . . . they are taking an active part [in the space program] where once they were skeptical."

Disarmament Bill Survives Senate Attacks

Washington—Senate has voted 73 to 14 to establish a "United States Arms Control and Disarmament Agency" after many expressions of skepticism over the need for such an organization in view of the dimming prospects for world peace.

An amendment that would have eliminated the key function of the agency—the conducting of research and development in the disarmament field—was defeated by a small margin, 46 to 43. Sen. Barry Goldwater (R.-Ariz.), sponsor of the amendment, objected to so broad a charter, declaring that "everything is related to disarmament. There is not anything that I can think of that they could not get into that would not be related in some remote way, at least, with disarmament."

Another amendment to refer the legislation to the Armed Services Committee and postpone Senate floor consideration until next February, was defeated 54 to 33.

Leading the opposition to the measure, Sen. Richard Russell (D.-Ga.), chairman of Armed Services Committee, argued that the present disarmament division of State Department "can perform any proper function relating to gathering data that would enable us to advise our President . . . if the time should ever come . . . when we can sit down and really negotiate in good faith in the effort to bring about an era of permanent peace."

Sen. Russell maintained that the new agency will simply duplicate the work of Defense Department and Atomic Energy Commission, which are spending "countless millions of dollars" in developing techniques for detecting, identifying, and monitoring of weapons.

"It adopts the policy that has been ever the policy of bureaucracies since the beginning of time, endeavoring to reach out and assume powers that are already located in other agencies," Sen. Russell said.

Under the legislation passed by the Senate, the new agency would be located in the State Department and headed by a $22,500-a-year Under Secretary of State for Disarmament. This is the main point of conflict with the companion measure unanimously approved last week by the House Foreign Affairs Committee, which would establish an independent "Arms Control Agency." The President proposed a semi-autonomous "United States Disarmament Agency for World Peace and Security," headed by a director operating under the direction of the President and the Secretary of State (AW July 10, p. 29).

Sen. Russell told the Senate that this is not "an appropriate time in world history for us to create a statutory body . . . at the same time we are calling on the American people to increase defense spending to the tune of $6 billion over and above the $40 billion that was contained in the original budget and are calling more than a quarter of a million more young Americans to the military service.

"We are urging those associated with us all over the world to increase their military strength in order that we may turn back the menace of Communist aggression. I submit that it would be absolutely impossible to explain to all the people of the world . . . that we are serious in our determination to defend liberty . . . while at the same time we are creating a disarmament agency."

The other view, expressed in a report by the Senate Foreign Relations Committee, recognized "that tension might increase even further. Nevertheless . . . the United States must be prepared to submit practical and serious proposals in this field. The national security requires that if opportunity is presented to make progress toward some limitation of armaments, there must be an acceptable framework for inspection and controls which will assure the American people that reductions in arms will not endanger their security."

The Foreign Relations Committee also anticipated that the renewal of atmospheric nuclear testing by the USSR and "its belligerent attitude" will result in increasing demands on the part of neutral states that progress be made in the field of disarmament.

Vela Hotel Contracts Detailed

Washington—Unclassified contracts let by Advanced Research Projects Agency under the Vela Hotel program for detection of atomic detonations in outer space and published recently by Senate Foreign Relations Committee, are:

- **Aerospace Corp., $358,000, from Oct. 1, 1959 to the present, for technical direction and systems engineering for satellite and piggyback flights.**
- **Lawrence Radiation Laboratory, $1.5 million for a three-year contract starting May 1, 1960, for piggyback instrumentation for six satellites to be launched into 100 to 300 km. orbits to measure radiation backgrounds.**
- **Lockheed Aircraft Corp., $485,000 for an 18-month contract starting Apr. 1, 1961, for integration of the Lawrence Radiation Laboratory instrument package into the launch vehicle and reduction of telemetry data.**
- **General Dynamics/Astronautics, $1,998,000 for a three-year contract starting Nov. 7, 1960, for construction of three ARPA environmental test satellites (ARENTS) for measuring the radiation background and performance of components at an altitude of 22,000 mi.**
- **Bendix Systems Division, Bendix Corp., $47,000 for a six-month contract starting Aug. 1, 1961, for investigation of the feasibility of prelaunch inspection of space vehicles for nuclear weapons.**
- **Harvard College Observatory, $173,000 for a three-year contract starting Apr. 1, 1961, for construction of radio frequency receiver packages to be flown on the ARENTS satellites and analysis of data.**
- **Naval Research Laboratory, $25,000 for consultants for prelaunch inspection.**
- **Rand Corp., a continuing contract for operations analysis of factors such as systems effectiveness against a determined test ban violator.**

Bomarc B Flight Test Program Completed

Flight test program on the USAF-Boeing IM-99B Bomarc B interceptor missile has been completed with the firing of the 35th B model missile, the last of 86 flight demonstrations called for in the research and development program.

During the test program, one of the missiles performed an intercept 400 mi. from the Eglin AFB, Fla., launch site against a target above 60,000 ft. In addition to maximum range intercepts, the Bomarc B also performed minimum range, minimum altitude missions against drone F-80 and B-47 targets and supersonic Regulus II missiles.

Tactical versions of the Bomarc B will continue to be fired from Eglin AFB as a part of the Air Force crew training and missile service test program.

These firings will continue for several months.

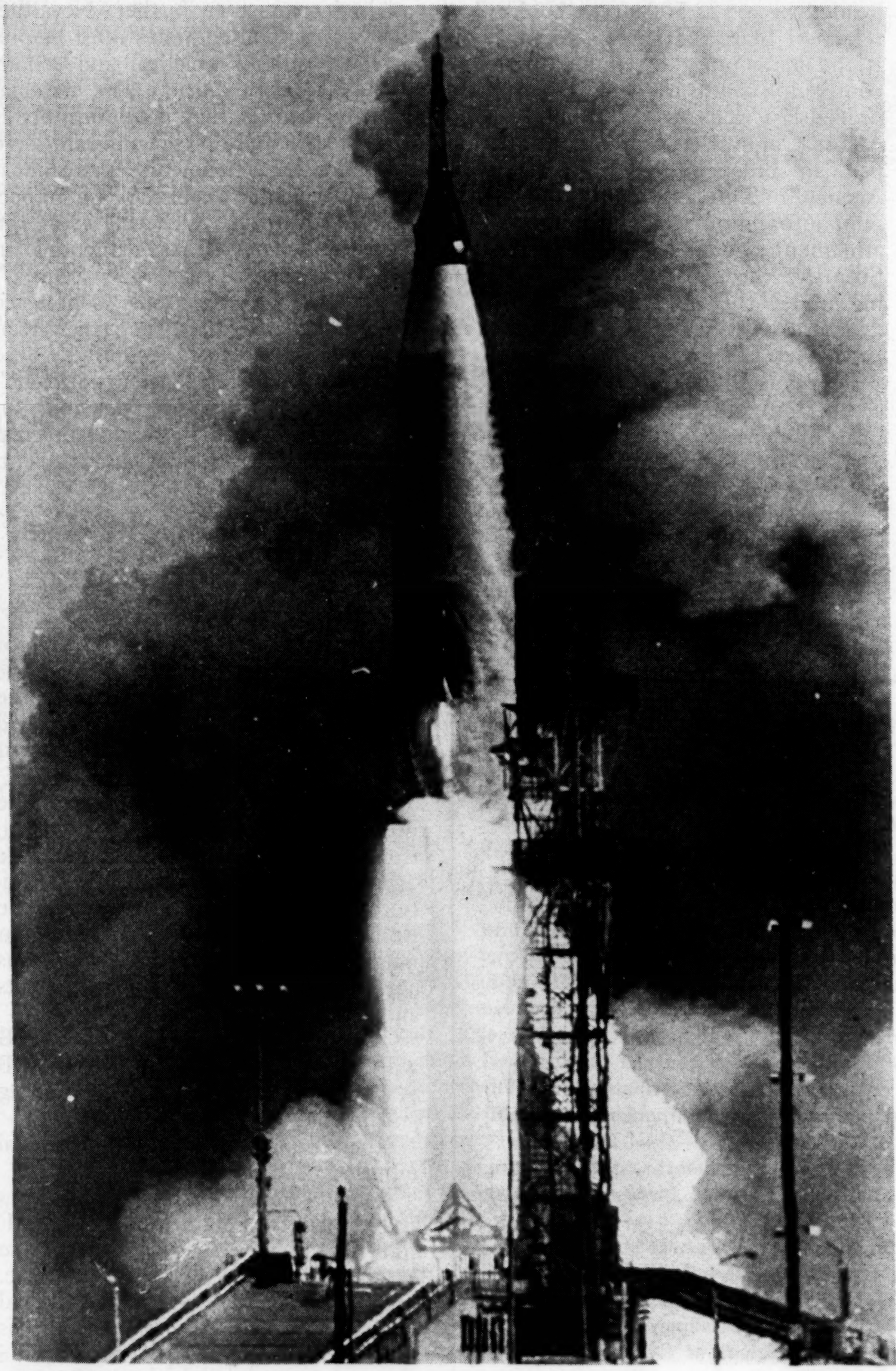
Bomarc B bases in the United States and Canada will be manned by USAF and RCAF crews. The first of these bases at Kincheloe AFB near Sault Ste. Marie, Mich., was declared operational June 1. Another Bomarc B base is operational at Duluth, Minn., and a third is nearing completion at Niagara Falls, N. Y.

MA-4 Flight May Advance Manned Orbit

Washington—Excellent performance of the Atlas launch vehicle and capsule systems in the first Project Mercury orbital flight has revived U.S. hopes that a Mercury manned orbital mission can be flown this year.

Mercury Atlas 4 (MA-4) was launched at 10:04 a.m. Sept. 13 from the Atlantic Missile Range to qualify the complete booster-capsule configuration, the capsule in orbit and re-entry, and the tracking network and the recovery forces. The mission was the 80th Atlas launched from AMR, and the first of the MA configuration fired since Apr. 25, when a vehicle similar to MA-4 was destroyed because of a programer failure.

After the launch, Dr. Robert C. Seamans, Jr., associate administrator of the National Aeronautics and Space Administration, said the agency has scheduled Atlas launches at intervals of six to eight weeks. Dr. Seamans and NASA Administrator James E. Webb both indicated that if the MA-5 flight in late October is successful, the MA-6 vehicle in mid-December could carry a man.



MERCURY ATLAS MA-4 vehicle lifts off launch pad at Cape Canaveral, Fla., at 10:04 a.m. Sept. 13. Booster put unmanned Mercury capsule in orbit for 84 min. 3 sec.

NASA will launch a telemetry package with a four-stage Blue Scout rocket to check out the entire 18-station ground communications network in a three-orbit mission. MA-4 mission was a single orbit, covering 12 stations.

After the failure in April, NASA, Air Force Systems Command's Space Systems Division and Convair made a series of fixes on the Atlas programer (AW May 15, p. 29), and later replaced faulty transistorized circuits (AW Sept. 4, p. 37).

As a result, Atlas performance in MA-4 was extremely close to that expected. Planned injection velocity was 25,690 fps., and the actual velocity was 25,710 fps. Planned perigee was 100.05 mi., and actual was 99.245. Programed apogee was 154.1 mi., and 158.6 mi. was attained.

The Mercury capsule, which was McDonnell Aircraft Corp. Production Capsule No. 8, contained an electronic device which simulated an astronaut in consuming oxygen, expelling carbon monoxide and in heat and moisture transfer.

Oxygen consumption was abnormally high, and if a man had been a passenger the mission would have been terminated after one orbit, according to Dr. Hugh L. Dryden, deputy NASA administrator. NASA feels the high oxygen expenditure was caused by a leak, and this malfunction is not considered critical.

Capsule launch was preceded by three major holds. The first was caused by a squall in the impact area, the second by a delay in fueling tanks, and the third, which lasted two hours, by a broken shingle bolt in the capsule structure.

The capsule weighed 3,900 lb. at launch. When it was inserted into orbit 4 min. 56 sec. after launch, the escape tower had been jettisoned and the orbital package weighed 2,700 lb. The capsule remained in orbit for 84 min. 3 sec., when the retrorockets were automatically fired by a timer while the satellite was over Guaymas, Mexico. This station was designated the command station to fire the retrorockets if the automatic system failed.

After the retropack and excess reaction jet hydrogen was jettisoned, the capsule weighed 2,200 lb. at impact.

The capsule landed 161 mi. east of Bermuda 109 min. after launch. It was recovered by the destroyer Decatur 91 min. after impact, in a calm sea. Decision was made to employ a ship pickup because the range was too great for a

Alpha Alpha 1 and 2

Washington—Mercury Atlas 4 flight will be recorded in scientific history as Satellite 1961 Alpha Alpha 1, since it is the 25th space vehicle launched in 1961, and the 24-letter Greek alphabet must be repeated.

The Atlas vehicle which boosted the Mercury capsule also became a satellite, and was designated 1961 Alpha Alpha 2. Booster went into a very low orbit and was not expected to remain aloft more than two days.

This was only the second time a U. S. booster has gone into orbit. The first occurred Dec. 18, 1958, in Project Score, also an Atlas-boosted payload.

helicopter retrieval. The Decatur was 34 mi. west of the landing point at impact. Helicopter pickup is the primary recovery method.

A shepherd's crook pickup method was used, in which the ship went alongside the capsule, and a bailing wire in the capsule neck was hooked by a crewman. The capsule was hoisted on board by the ship's davits.

Sensors in the capsule indicated a launch acceleration load of 7.6 g, and a re-entry load of 7.8 g. Cabin pressure remained constant at 5.5 psi. During the flight, an inverter in the environmental system fan failed. The system was switched to a standby inverter by ground command. The UHF and HF links from the capsule were lost between Woomera and Canton Island, but all stations reported excellent reception while the capsule was in view. Tapes were used to simulate capsule voice transmissions.

Stations covered by the capsule in the first pass were Cape Canaveral; Grand Bahama; Grand Turk; Bermuda; Grand Canary; Kano, Nigeria; Zanzibar; Muchea, Australia; Woomera, Australia; Guaymas; Corpus Christi, Tex., and Eglin, Fla.

On a three-pass mission, the satellite will pass over these stations, and Kauai, Hawaii; Point Arguello, Calif., and White Sands, N. M.

Canada to Order CL-41

Royal Canadian Air Force will soon sign contracts to order the Canadair CL-41 jet trainer, probably both the CL-41A basic trainer version and the CL-41R, equipped with electronic systems for the Canadair-built Lockheed F-104 fighter also on order by RCAF.

Price of the basic trainer is about $200,000 and the R version approximately $450,000. The Canadian order, estimated to total 190 aircraft, may encourage German purchase of the R version and Swedish interest in the basic trainer. Powerplant is a Pratt & Whitney JT12 turbojet.

Deliveries to the Royal Canadian Air Force will begin in 1963. No increase in employment at Canadair will result, but the order will halt further layoffs.

Dr. Seamans said the agency wants to orbit a capsule identical to the manned capsule before a man is launched into orbit. Difference between MA-4 and later capsules is that MA-4 had no quick opening escape hatch, and it did not have an impact skirt. Six chimpanzees have been trained by USAF at Holloman AFB, N. M., for orbital Mercury flights, but a decision is not final on whether MA-5 will contain a chimp or no passenger. It will be programed for three orbits.

Final decision on the next mission, and on timing for an astronaut flight, will be made by Webb, who said he will base his decision on the recommendations of Dryden, Seamans, Robert R. Gilruth, director of Project Mercury; his deputy, Walter Williams, and the seven Mercury astronauts.

Ford, Philco Boards Agree on Merger Plan

New York— Ford Motor Co. will acquire Philco Corp. on Nov. 30 under a stock exchange agreement, subject to approval of holders of Philco preferred and common stock.

The boards of directors of both companies met last week and agreed in general to the merger plan, which specifies that Ford will exchange a share of Ford common stock for each 4½ shares of Philco common. Philco preferred stock will be exchanged for Ford common stock worth about $101.50 a share, and cash covering accrued and unpaid dividends. The ratio will be based on the market value of Ford common stock shortly before closing of the transaction, which is set for Nov. 30.

On the West Coast, Ford Motor Co.'s Aeronutronic Division is investigating a number of possible organizational expansions which would provide it with plant capacity for production under three major programs—the Army Shillelagh missile, a Navy anti-submarine warfare project and an Air Force ballistic decoy project.

The company is considering the purchase or lease of plants or potential plant sites in a number of locations. It is also considering acquisition of a major aerospace company.

Among the plans under consideration are:

- **Leasing of land** on the giant Irvine estate which borders the Pacific Ocean in Orange County, Calif., and is adjacent to Aeronutronic's present research and development facilities in Newport Beach, Calif. The estate has let 1,000 acres to the University of California for cultural and educational facilities to be opened in 1965. An industrial park area is expected to arise there.
- **Leasing or purchasing land** in the Laguna-Niguel area which is further below Newport Beach along the ocean.
- **Purchasing all or part** of General Dynamics San Diego's plant No. 1. An Aeronutronic spokesman denied industry reports here that the company is currently negotiating with General Dynamics for the purchase of the San Diego facility.

Missile Center Reports Work Stoppage Totals

Washington—Air Force Missile Test Center in Florida lost 87,423 man-days through work stoppages in the five-year period ended June 30, according to officials there.

This loss amounts to 0.5% of the 16,606,700 man-days worked at the center and at the Atlantic Missile Range in the five-year period. Building trades unions accounted for 73,850 man-days lost, or about 84% of the total.

The losses were caused by 113 work stoppages ranging from 30 min. to 19 work days.

The 19-day strike was an organizational dispute with the Teamsters Union doing the picketing. It started on May 21, 1957, and accounted for 42% of all the man-days lost in the five-year period, according to the report.

Later figures for all missile centers show work stoppages have decreased sharply since President Kennedy appointed the Missile Sites Labor Commission (see p. 77). The commission on Sept. 12 was instrumental in ending a strike at Lowry AFB. Union leaders sent 300 members back to work pending a settlement recommendation of the commission.

Finland Negotiating Mirage IIIC Order

Geneva—Finnish air force, rebuffed in its efforts to buy late-model versions of the Saab Draken interceptor from neighboring Sweden, is negotiating with France's Dassault for a limited order for the Mirage IIIC all-weather fighter within the near future.

The order, if it materializes, will mark another export success for the Mirage within the past several months. Australia and Switzerland have placed orders for the Mk. C version and, although officially unannounced, versions of the Mirage are being delivered to Israel.

South Africa also is known to be considering the aircraft.

Nike Zeus Second Stage Explodes On First Launch From Pt. Mugu

By Russell Hawkes

Pt. Mugu, Calif. — Destruction of Army's first Western Electric-Douglas Nike Zeus to be launched from here was not caused by command transmitted from the ground, according to an Army spokesman.

Zeus has several destruction systems including an automatic fail-safe system that destroys the missile if contact is lost between the missile and the command guidance unit on the ground.

Determination of whether the missile exploded spontaneously or was destroyed by the automatic fail-safe system had to await complete reduction of data tapes. It is now reported complete but Army has made no announcement and officers say none is expected.

The missile exploded very few seconds after ignition of the 350,000-lb.-thrust second stage built by Grand Central Rocket Co.

The launch and first-stage operation appeared to be highly successful. According to Project Officer Col. Glenn Crane, "all launch gear and ground equipment worked properly." The test had been delayed a month by trouble encountered in the ground electronics of the system.

"Commands were transmitted to the missile, received, and executed. Boost phase, separation and second stage ignition were completely successful. Some problem occurred during the burning of the second stage and the flight terminated," Crane said.

The missile was mounted upon a conventional rail launcher elevated to an angle of about 70 deg. A few seconds before the programed ignition time, a thin cloud of smoke appeared beside the final stage of the missile as the hot gas generator spun up the on-board power unit. At ignition, the missile lifted off the end of the rail, accelerating at about 700 fps.

Elevation Angle

Obeying orders from the command guidance system, it appeared to increase its elevation angle to climb on a more nearly vertical trajectory and executed a few other programed pitch and yaw maneuvers. Slightly under five seconds after ignition, the 350,000-lb.-thrust second stage was started and accelerated away from the booster. Some flame was still visible at the nozzle of the booster. Moments later the second stage exploded in a symmetrical, expanding cone of smoking fragments. The expended booster coasted upward through the center of the burst and fell several miles offshore.

The flight had been intended to test only the command guidance system, the first two propulsion stages, autopilot and aerodynamic controls. The second stage motor which exploded was not the most advanced which has been tested in the Zeus system. An advanced version made by Thiokol will be used in later tests. It has been tested successfully at White Sands Missile Range, N. M.

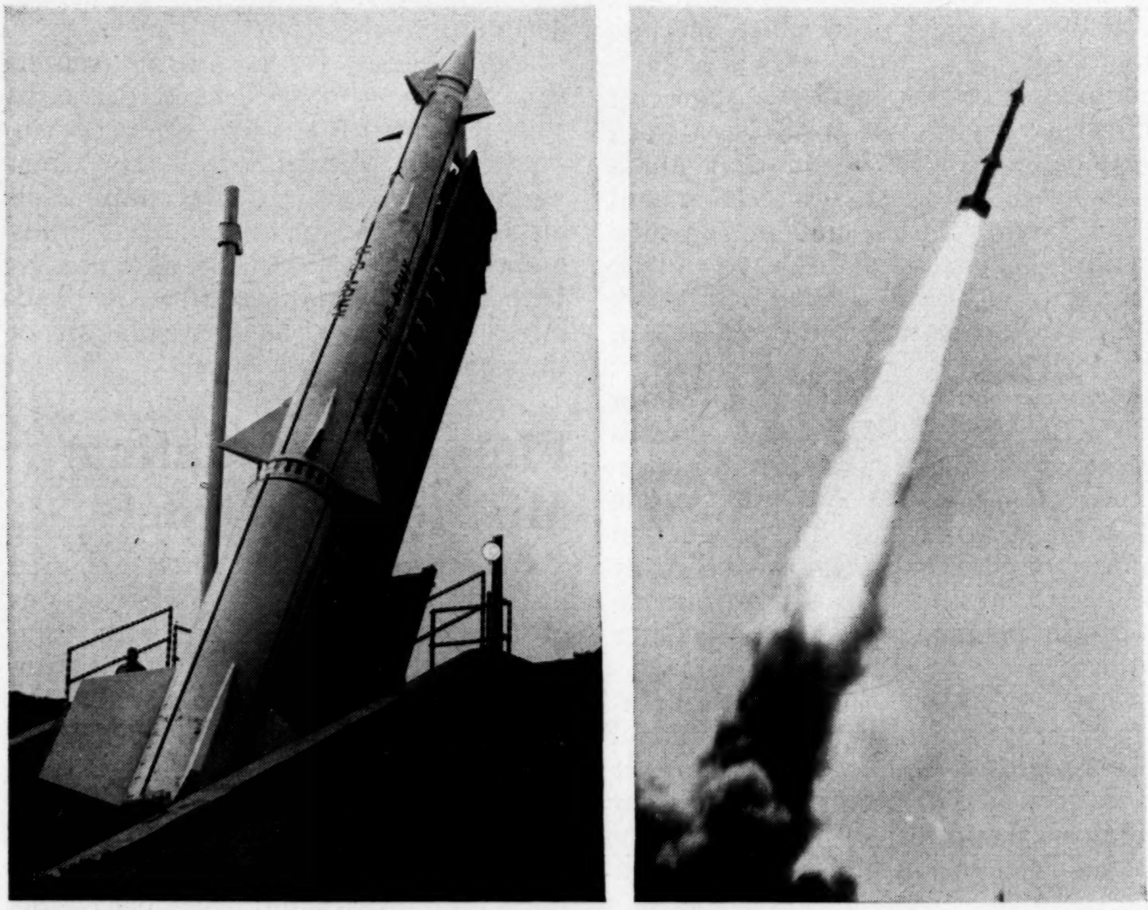
The jet-head motor which provides final stage propulsion as well as reaction control for use outside the atmosphere was not installed in the missile launched from Pt. Mugu. The canard aerodynamic control surfaces also contain the jethead nozzles.

In a full three-stage flight the canard and jet-head will provide control in all stages.

Automatic destruct systems are used in Zeus because the missile's rapid acceleration (more than 20g initially) makes human reflexes too slow to cope with a developing emergency. The system was scheduled to be operative between T plus 5 sec. and T plus 11 sec. During this period, the missile exploded at an altitude above 20,000 ft. Two Pacific Missile Range officers and a Zeus project officer also can transmit destruct commands to the missile manually. The fail-safe destruct that functions on loss of communication is the final means of halting a dangerous flight. The automatic destruct system which is controlled by an IBM 709 computer drawing information from the Nike Zeus missile tracking radar, cosine tracking receiver, and FPS-16 radar. The automatic system functions if the missile deviates from its flight program beyond limits set by range safety.

The Pacific Missile Range range safety and range operations staffs had their jobs complicated by the fact that a USAF Samos reconnaissance satellite was scheduled to be launched at nearly the same time from the Naval Missile Facility Pt. Arguello about 100 mi. up the coast. Its Atlas booster exploded on the pad shortly after ignition and about a half hour before the Zeus was launched from Pt. Mugu.

The taped guidance commands sent to the Nike Zeus during the test by its target intercept computer were arbitrary maneuvers intended only to demonstrate the operation of the system. In later tests from Pt. Mugu, the target intercept computer will be fed tape-recorded missile tracking data from actual missile flights on the Atlantic Missile Range. The tracks were collected by a Zeus missile tracking radar installed at Ascension Island, 4,500 mi. down range from Cape Canaveral.



NIKE ZEUS on the launcher at Pt. Mugu (left) shows blast ports between the first and second stages and the aerodynamic control surfaces on the nose of the inert final stage. There is no coast phase before ignition of the second stage. It is fired directly off the nose of the first stage and the blast ports are needed to dispose of exhaust gases. In the Pt. Mugu test, the second stage appeared to fire before burning had ceased in the first stage. At right, Army's first Nike Zeus accelerates at more than 700 fps.

FAA Certificates Umbaugh U-18

Hagerstown, Md.—Federal Aviation Agency issued a type certificate to the Umbaugh Aircraft Corp. last week for the company's U-18 autogyro.

Accepting the certificate for Umbaugh, Gil DeVore—chief engineer for the firm and designer of the U-18—said that he estimates that the first production model will be built in January of next year.

He said Umbaugh believed it could adhere to the announced price of $10,000, "but it will be a stripped airplane—flyable, but without gadgetry." Prices are expected to range up to $12,000.

DeVore said that all dynamic parts are certificated for unlimited life and will have to be replaced only as conditions warrant. He feels that most parts will last through 1,000 flying hours.

Improvements are planned for the U-18 and Umbaugh has ordered an experimental 205-hp. engine from Lycoming. Other plans envision a ducted propeller and a four-place model. Present U-18 is a two-seater.

FAA certified the craft for an approach speed of 50 mph., giving it a landing roll of 50 ft. DeVore, however, feels that any pilot with some experience can land the gyroplane at 30 mph., with virtually no roll. FAA is said to be considering establishing a fourth pilot certificate category—gyroplane—in addition to fixed-wing, rotorcraft and glider ratings.

White House Replies On Satellite Ownership

Washington—White House has ruled out making a decision on ownership of an operating communications satellite system "at this time."

In a memorandum to Rep. Emanuel Celler (D.-N. Y.), released last week, the White House said that "any decisions as to control should preserve as much flexibility as possible for any future modifications that may be required by changed circumstances."

The memorandum clarifying and re-emphasizing the Administration's policies—including "maximum competition" in any system of private ownership (AW July 31, p. 25)—was in response to a letter from Rep. Celler and 34 other members of Congress expressing concern that a committee of ten common carriers will recommend an ownership structure dominated by American Telephone & Telegraph Co. (AW Sept. 4, p. 32).

The committee, appointed by Federal Communications Commission, has an Oct. 13 deadline for submission of its recommendations. The Senate Small Business Monopoly Subcommittee, headed by Sen. Russell Long (D.-La.), has scheduled an Oct. 17 public hearing on these recommendations.

The White House memorandum rejected the request of the 35 congressmen that any actions affecting ownership of a space communications system be postponed until the system is "fully operational."

"It is not possible, if we are to move swiftly, to delay decisions as to ownership and control until after the entire system becomes fully operational," the memorandum stated. "The development of a fully operational system will probably require a decade or more. As envisaged, full operation would be global in service, as to voice, record, and pictures. This will have to come over a period of time, not only for technological reasons, but because many countries will not be able to receive and convey services in their present stage of development. While global coverage is the ultimate objective, it would not be sound and realistic to withhold the services within the system's capability until total coverage had been completed.

"This is true regardless of the form, nature, or diversity of ownership."

High-Speed Helicopter Tests

Hurst, Tex.—Test program pointing the way to obtaining marked gains in helicopter speed and range will be initiated by Bell Helicopter Co. here under a U. S. Army contract utilizing an HU-1 Iroquois as a research vehicle.

Army's Transportation Research Command awarded Bell a $491,000 contract to study means of improving helicopter performance, with the program to be completed and a report submitted in December, 1962.

Studies by Bell engineers with company funds indicate that major performance gains can be achieved for the HU-1 turbine-powered series by reducing fuselage drag, utilizing a new three-blade rotor on a variable-tilt pylon and increasing horsepower. It is estimated that these refinements could increase the HU-1's present range of 1,000 mi. to approximately 1,400 mi., with an increase in top speed from a current 147 mph. to better than 180 mph.

The Trecom study is probably to be considered a basic research document which may have across-the-board application to all helicopters rather than as a specific improvement program for the HU-1.

News Digest

House Commerce Committee, in the wake of a flood of complaints to Congressmen, has been voted $150,000 to investigate "aircraft noise nuisances and hazards" and make recommendations for measures that would alleviate the problem.

U. S. and Italy last week continued simultaneous launches of sodium flares to study upper wind activity and shear. U. S. readings from Wallops Island, Va., launches will be correlated with data from Italy's launches from Sardinia.

USAF-Lockheed Discoverer XXX was successfully placed in orbit Sept. 12 with a period of 92.4 min., an apogee of 345 mi. and a perigee of 154 mi. The flight was part of a continuing program to attain more precise orbits.

James M. Landis, special assistant to President Kennedy for streamlining of regulatory agencies (AW Jan. 2, p. 28) and former Civil Aeronautics Board chairman, submitted his resignation effective Sept. 1.

Navy will build a Scout launch complex for the National Aeronautics and Space Administration at the Naval Missile Facility, Pt. Arguello, Calif. The pad, first West Coast launch facility to be built for the space agency, has been scheduled for completion by March, 1962.

Cancellation of a sales agreement involving purchase of two Boeing 707-420 jet airliners for use by Ghana Airways has been agreed to by the Boeing Co. and the government of Ghana. Boeing officials said lack of timely financing to meet early delivery dates was the reason for voiding the agreement.

Courtlandt S. Gross has been elected chairman of the board of Lockheed Aircraft Corp. succeeding his brother, Robert E. Gross, who died recently (AW Sept. 11, p. 33). Courtlandt Gross had been president of Lockheed for five years and will be replaced in that office by Daniel J. Haughton, formerly executive vice president of the corporation.

Adm. DeWitt C. Ramsey, USN (ret.), president of the Aerospace Industries Assn. from 1949 to 1957 and vice chairman of the board of governors from then until January, 1960, died Sept. 7 at Philadelphia Naval Hospital. He was 72.

AIR TRANSPORT

CAB to Meet Trunk Presidents Informally

Heads of most carriers accept invitation to discuss industry's steadily deteriorating economic situation.

By Robert H. Cook

Washington—Chairman Alan S. Boyd and the Civil Aeronautics Board have seized the initiative in dealing with the airline industry's welter of complex problems by inviting the presidents of all major trunk carriers to an informal meeting on Sept. 28.

Boyd limited the invitation to the "chief executives" only to generate a better discussion on how to solve the industry's steadily deteriorating economic situation. By the end of the week a majority of the airline presidents had accepted the invitation to participate in the four-hour session.

Topics suggested by the Board for discussion included financing, fares and rates, routes, cargo, competition and passenger services.

Boyd expressed deep concern over the industry's financial position, which showed a $13.5-million loss for 11 trunklines during the first half of this year. He said the "let-your-hair-down meeting" was probably the first time the Board has taken such an approach to probing the industry's needs.

Presidents' Reactions

Most of the airline presidents reacted to the invitation with a mixture of surprise and anticipation, tempered with some doubt that much could be accomplished or learned that is not already common knowledge. None disclosed the stand he would take on any of the suggested issues, and several questioned whether four hours would be sufficient time to air them thoroughly. In general, they seemed to welcome the chance for a closed-door debating session with their own competitors and the five CAB members.

There is a growing belief in the industry that Boyd may choose the opportunity to assert his leadership and the full scope of the Board's powers by quietly spelling out just how firm it intends to be in handling the airline's conflicting desires.

On the other hand, it has been suggested that Boyd might well benefit more from the meeting than the carriers if the close encounter revealed heretofore closely-guarded thinking on such crucial subjects as possible mergers.

Boyd has said the meeting will not discuss specific fares. This might constitute a violation of anti-trust laws that prohibit such discussions between competitors. Fare and rate "philosophy" will be discussed, however, and it is unlikely that talk of actual fares could be avoided, since the rash of low fares now being tested by many airlines is one of the more immediate problems (AW Sept. 4, p. 38). Many of these fares are being offered solely as a competitive measure.

Profit Yield

One of the questions almost certain to be raised by some airlines is the matter of profit yield on low-fare seats as opposed to first-class service, and how to keep one type of promotional fare from detracting from another. The Board has directed the airlines to file reports every three months on the results of these programs.

A problem related to whether or not fares should be increased is the industry's rate of return, which tailors its permitted earnings to a complex formula calculated on its investment base. Airlines have never been able to reach the CAB authorized rate of about 10%, and many have pressed for a formula that would recognize their heavy capital turnover by basing profits on a profit-margin formula.

Although mergers were not listed on the CAB agenda, it also would be a difficult subject to avoid in any discussion of competition or routes. This is particularly true in light of the United Air Lines merger with Capital Airlines, the Board's investigation of the November expiration of Northeast Airlines' authority to serve Florida, and Northeast's previous merger talks with Trans World Airlines.

CAB's philosophy on the granting of future mergers is likely to be spelled out at the meeting—a course of action strongly urged by the Project Horizon report (AW Sept. 11, p. 34).

There is no definite indication

CAB Examiners' Power

Washington—Civil Aeronautics Board last week moved to give its hearing examiners greater authority by issuing a proposed revision of procedural regulations for airline comment.

Designed to implement the President's Reorganization Plan No. 3, the proposed change would decrease Board members' workload by delegating decision-making authority to hearing examiners in safety and economic hearing cases, subject only to the CAB's right to review. Reviews would be granted on the request of a party to the case, or on the initiative of two or more Board members.

Industry comments will be required by Oct. 30 for CAB study preparatory to issuance of a final rule.

Project Beacon Report

Washington—Long-awaited Project Beacon report, scheduled to be transmitted soon to President Kennedy, will recommend against adoption of SAGE air defense computers for Federal Aviation Agency air traffic control use and will propose using only a part of the data processing system which FAA has developed.

The report will recommend that radar become the primary traffic control tool, and that radar scopes rather than flight progress strip boards become the primary display for traffic controllers.

It also will recommend that airborne radar transponders be used to provide automatic aircraft altitude reporting instead of air-ground data link or height-finder radar (AW Aug. 7, p. 41). With the use of radar and automatic altitude reporting, the report predicts that the load on voice communication channels will be greatly reduced, eliminating the need for data link communications.

These recommendations, particularly the one against use of SAGE, may prove controversial. Some Air Force officials had strongly urged the use of SAGE for traffic control but others within USAF were not as enthusiastic.

The Beacon report was prepared by a special task force under Richard R. Hough, which was formed last spring by FAA Administrator Najeeb E. Halaby to recommend the tools and techniques needed for improved air traffic control. A sizable part of the report is devoted to recommendations for more efficient use of the airspace.

whether Boyd or any other CAB member will suggest any radical new approach to the problem of overcapacity, which has plagued most trunk turbojet operations and caused a steady decline in load factors. But Boyd has continuously urged more experimentation with lower air fares, as has Member G. Joseph Minetti, and has often indicated that airlines may be providing too much costly first-class transportation, with expensive frills that boost operating costs.

The steady shrinkage in first-class boardings, as opposed to the heavy coach or tourist type load factors on the same aircraft, has led many observers to believe that the Board may suggest that airlines designate certain flights as all first-class and others as all coach.

Board members naturally will guard against revealing progress in matters still in the hearing stage or pending a Board decision, but the subject of a new carrier to compete with United along Capital's former route between Chicago, Cleveland, Detroit and New York could arise under a discussion of routes or competition.

In the field of international competition, Boyd already has been criticized by several airlines for a lack of action, but has stated that CAB will act to offset the growing impact of foreign flag competition, on the basis of a CAB study and the Horizon report.

Horizon noted that the U. S. should be more alert to the relative economic merits of route exchanges with foreign nations and should demand more concessions to protect the markets of U. S. flag carriers. The report also suggested that in selecting one U. S. airline to compete with another abroad, granting of a certificate for a new route be conditioned to a sufficient volume of traffic to support a daily round trip for each airline. Otherwise, the report said, only one carrier should be assigned to the route.

Foreign competition is of great interest to Boyd, who has testified at length before Congress on the matter, but his hopes for influence to improve this situation face the hurdle of combined White House and State Department philosophy, which has prevailed in the past on bilateral discussions and route awards.

Speculation on the positions Boyd and other members may take on vital issues scheduled for discussion can be judged by public statements and interviews conducted in the past year or so.

When he was first appointed a member, Boyd defended past CAB policy on awarding routes to promote vigorous competition between trunk carriers but said he believed CAB should keep a close check on daily flight patterns in several market areas to avoid adding any more competition that might dilute revenues.

Member Whitney Gillilland, then chairman, concurred and warned that over-competition could be aggravated by the use of high capacity turbojet aircraft. Both men said they expected to see several merger applications before the Board.

International air fares, set by an International Air Transport Assn. agreement, also should be subject to more control by CAB, Boyd said. The agreements for these fares are filed with CAB, but the Board should have "at least standby authority" to establish rates and protect U. S. interests in the event that IATA abandons this practice, he said.

Gillilland suggested at that time that CAB be given greater power in the setting of international fares, but cautioned that such authority would have to be used sparingly to minimize possible "countermoves" on fares and rates by foreign powers acting on behalf of their flag carriers.

Chan Gurney, then vice chairman of the Board, favored mergers but cautioned against any carrier combination which would result in putting one airline "way out in front to cover the whole field." Such a merger might result in the remaining competing airlines being unable to finance new flight equipment, precluding chances of lowering fares.

Gurney also cited the heavy investments in new equipment made by the trunks and their independence from subsidy as practical proof that the controversial rate of return formula for measuring airline profits is justified.

Minetti, because of his refusal to compromise his philosophy of encouraging the best possible airline service at the least possible cost to the public, can be expected to reject any carrier arguments for higher fares. He supported the United-Capital merger and could be expected to vote for other mergers that might keep a financially distressed trunk carrier from returning to subsidy.

CAB Is Asked to Limit Route Probe

Washington—United Air Lines and Lake Central Airlines have asked Civil Aeronautics Board to limit the scope of the current competitive service investigation to prevent what Lake Central calls "a Northern Transcontinental Route Case."

The investigation was ordered last July 25 (AW July 31, p. 40) by CAB to select carriers to operate in competition with United in four markets where United was left unopposed after its merger with Capital Airlines.

So far, 10 airlines have filed petitions with CAB seeking authority to operate between some or all of the four pairs of points named by the Board. The markets involved are: Cleveland-New York, Cleveland-Chicago, Cleveland-Philadelphia and Philadelphia-Detroit. Most of the applicants have asked the Board to include in the proceeding route applications involving new through plane service to points other than those named.

United has asked the Board to limit the scope of the investigation to through plane service between each of the pairs of cities named, or to limit service to that which Capital could have provided under its prior authority.

United also asked CAB to consider the final outcome of the United-Capital merger now before the District Court of Appeals here for judicial review. United wants CAB to delay the investigation until later in the court proceeding in the event the merger decision is overturned. Trans World, Northwest Airlines, American Airlines and Continental Airlines were opposed to this.

Eight of 10 carriers involved in the investigation are opposed to any prior restriction regarding the scope of the issues. They say that any restriction of issues will prejudge the case and hinder the Board's effort to evaluate how the public interest can best be served. These carriers point out that all parties will have the opportunity to urge the Board to restrict any authority granted during the course of the investigation.

Peruvian Air Carrier Readies Miami Service

Washington—Peru's Faucett Airlines is making final preparations to become an international carrier serving Miami under a five-year foreign air carrier permit awarded recently by the Civil Aeronautics Board (AW July 11, 1960, p. 41).

Extension of Faucett's 32-yr.-old regional route system from Lima to Miami implements a bilateral agreement between Peru and the U.S. signed 15 yr. ago for a route by Peruvian carriers through Panama, Havana, Washington, D. C., New York and beyond to Montreal. Later amendments to the agreement eliminated New York and added Miami.

Anticipating the grant of the permit, which also carries the right to conduct off-route charter operations, Faucett last year purchased a Douglas DC-6B aircraft at a cost of $650,000 from Pan American-Grace Airways.

Initial service over the Lima-Panama City-Miami route, expected to be inaugurated by the end of this year, will be two round trips a week.

American Negotiating Convair 990 Solution

American Airlines and General Dynamics Corp. were negotiating last week toward a solution to the problem raised by failure of the Convair 990 jet transport to meet its original speed guarantees.

Possibilities as they appeared at mid-week were:

- Acceptance of the airplane in its present condition. Four 990s now are in flight status, six are being completed on the flight line, 10 are in assembly. This solution might allow American to put the aircraft in service, and possibly send them back for modifications later.
- Delivery delay, in addition to that already experienced because of earlier pod oscillation problems, which might be extensive.
- Cancellation by General Dynamics or by American. Observers felt this the least likely possibility. General Dynamics' prestige would suffer, and American needs the airplanes.

Officials of Swissair, which has ordered seven 990s and is using Convair 880 Ms under an interim arrangement, also were talking to General Dynamics in the U. S. last week. But it is felt that what American agrees to will set the pattern for other customers.

The 990 failed to make specification speeds in flight tests because af a drag problem. Wind tunnel tests to determine a fix will be run at Cornell Aeronautical Laboratory through the first half of next month. Cost estimates for modifying the airplanes can be made after the test information is obtained.

The airplane, which originally was supposed to have been a medium- to long-range transport with transcontinental capability, is believed no longer to be in the transcontinental category with its present drag problem. Top speed of 640 mph. called for in the original specifications would have given 990 operators a sizable competitive speed advantage.

Further write-offs in the General Dynamics jet program will be caused by the present troubles (AW Aug 14, p. 37). Write-offs for the first half of 1961 totaled $116,500,000.

If General Dynamics were to cancel the program and write off the entire 990 costs for tax purposes, it would be following a precedent set with the Martin 3-0-3.

In December, 1947, Martin decided to scrap its program for the pressurized airplane. To get a complete tax write-off of $15.3 million, the single uncompleted aircraft was destroyed, along with all associated equipment including drawings.

Navigators Charge FAA Meddling In Doppler Argument With TWA

Washington—Threat of a possible navigators strike at Trans World Airlines dominated the airline industry's labor scene last week, as the Airline Navigators Council charged the Federal Aviation Agency with interfering in a planned resumption of contract talks on TWA's proposed adoption of a dual doppler radar navigation system.

In other labor developments, the Feinsinger Commission met again with pilot and flight engineer negotiating committees in an attempt to settle disputes at Pan American World Airways, and the Air Line Pilots Assn. announced that the Flight Engineers International Assn. chapter at Slick Airways has signed an agreement to merge with ALPA. The pilots' union also announced the terms of a new contract signed by its flight attendants division with Braniff Airways.

The TWA dispute concerns the airline's proposed adoption of the doppler system and its use by pilots as a primary means of navigation, eventually costing an estimated 60 navigators their jobs.

The latest protest from ANC came after the FAA noted that approval of the system would depend on a final series of inflight tests to start late last week or early this week on six scheduled TWA international flights. FAA added that the airline must also demonstrate that a satisfactory pilot training program had been established for doppler use as well as refinements in operational procedure.

Timing of the FAA notice, released one day prior to a scheduled resumption of contract talks, triggered a strongly-worded telegram from ANC President Fred Summers to FAA Administrator Najeeb Halaby, Secretary of Labor Arthur Goldberg and other government officials.

Summers warned negotiations would not be resumed if agency inspectors attempt to go ahead with the further evaluation flights designed to "test elimination of navigator requirement which is an issue in negotiations."

Summers later noted that the navigators are not opposed to the use of doppler, but are concerned with where it will be placed and by whom it will be used. He said that despite an earlier agreement with the company to postpone FAA evaluation of the system pending further contract talks, FAA's New York office planned to put evaluators on TWA flights by the end of the week. Such action would bring an immediate strike by the navigators, he warned.

FAA replied that its notice was intended to clarify its position on doppler and that any further cooperation in tests with TWA would be a decision left to the airline. TWA said it had scheduled an evaluation test for Sept. 17.

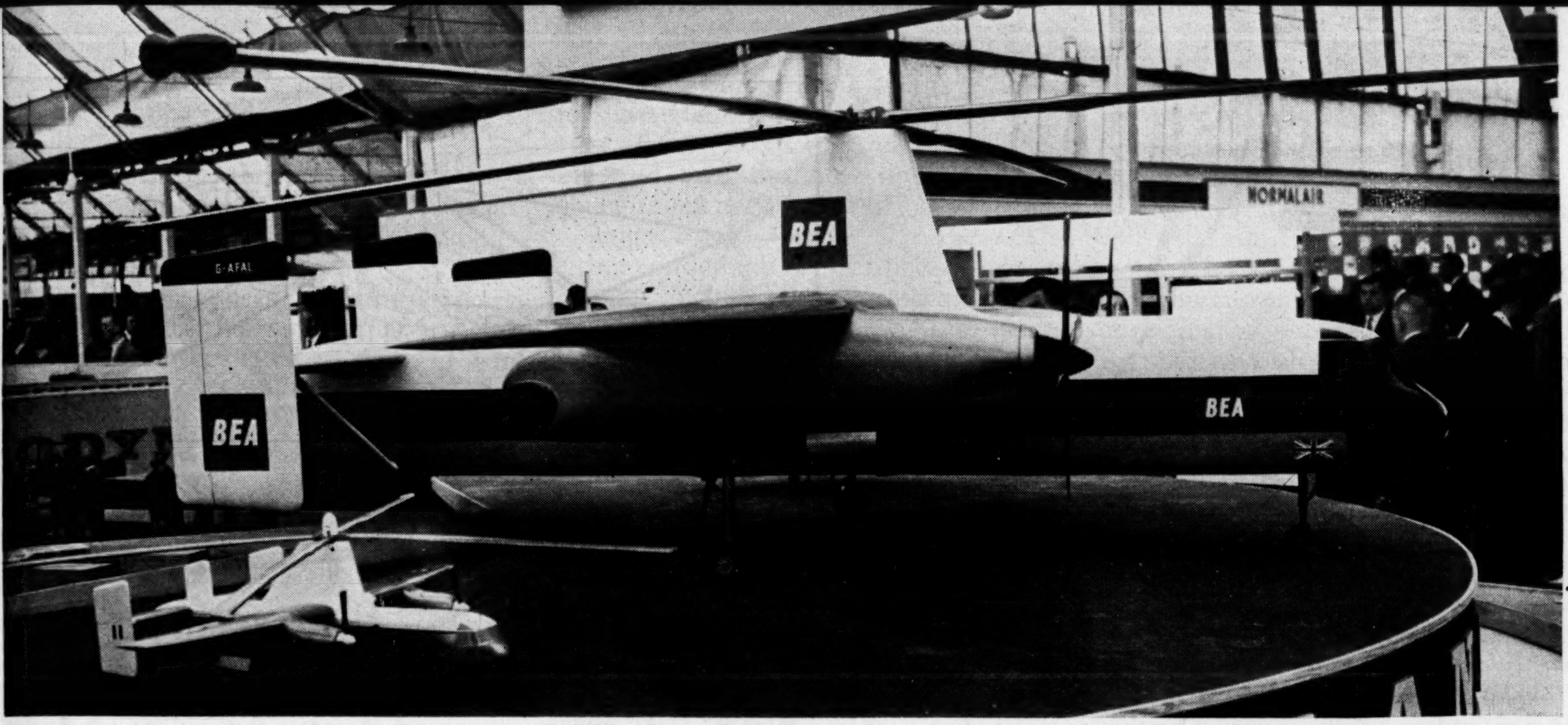
The airline's doppler plans have met some opposition from TWA pilots. They pointed out that the ALPA master executive council at TWA has passed a resolution criticizing the system as creating an increased workload for pilots, possibly leading to the displacement of regular line pilots now serving as navigators on some carriers and requiring constant FAA supervision for operation.

At Slick Airways, 15 FEIA members dissolved their chapter and merged with ALPA under an agreement which noted that "it would be in their best interest to have one organization represent pilots and engineers." The engineers will be placed on the ALPA seniority list, with the choice of either taking pilot training at company expense to qualify them for future employment on turbojets, or continuing their service on piston and turboprop aircraft until their equipment is phased out. At this point, said ALPA, the engineers would be offered severance pay.

ALPA's new two-year contract for Braniff flight attendants provides for pay increases of as much as $110 per month for senior flight attendants on piston aircraft, $126 a month on turboprops, and $141 a month on turbojets. The raises are retroactive to Sept. 1, 1959 and are expected to bring retroactive payments averaging more than $1,050 for each attendant, ALPA said.

Also, 21 improvements were made in rules and working conditions, the union said, with important provisions covering maximum time on duty and an employe option to fly only 80 hours a month on turbojets, if they so desire.

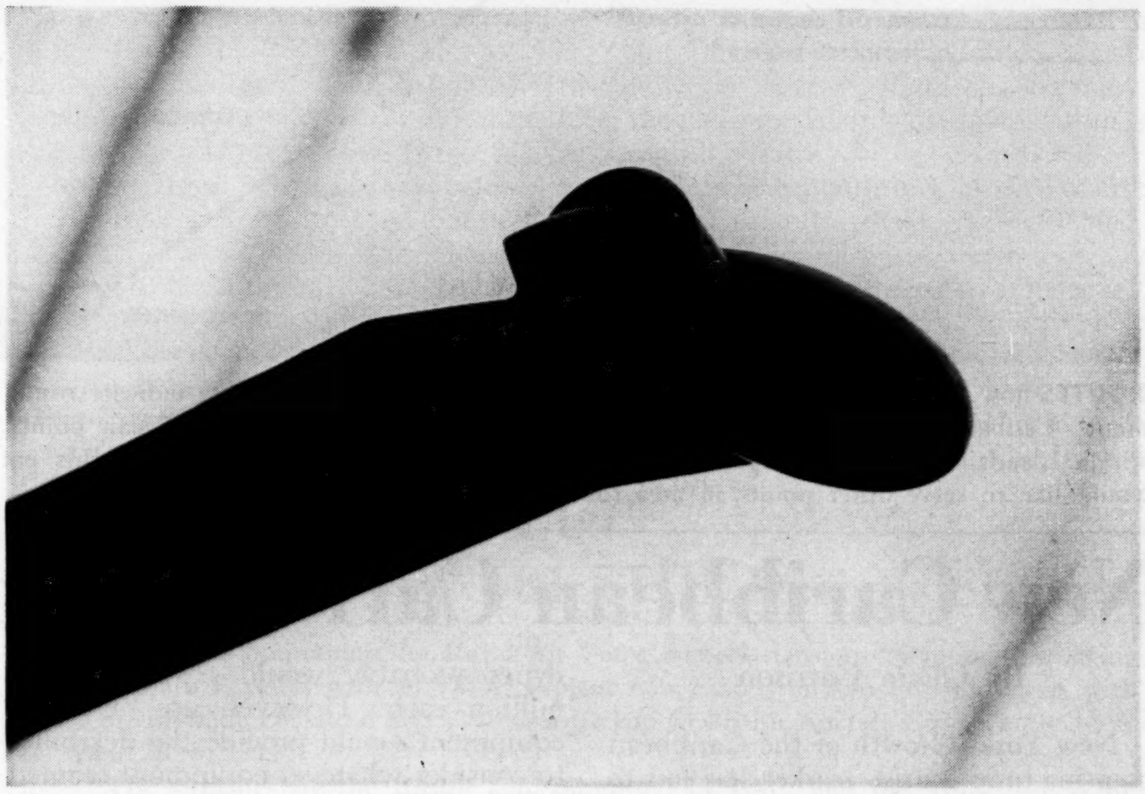
Spokesmen for the Feinsinger Commission reported that talks with ALPA and FEIA negotiating committees on Pan American World Airways were being held in Washington, D. C., and that a final report by the commission, appointed by the White House to investigate causes of a nation-wide shutdown of major airlines last February by FEIA, might be made this week.

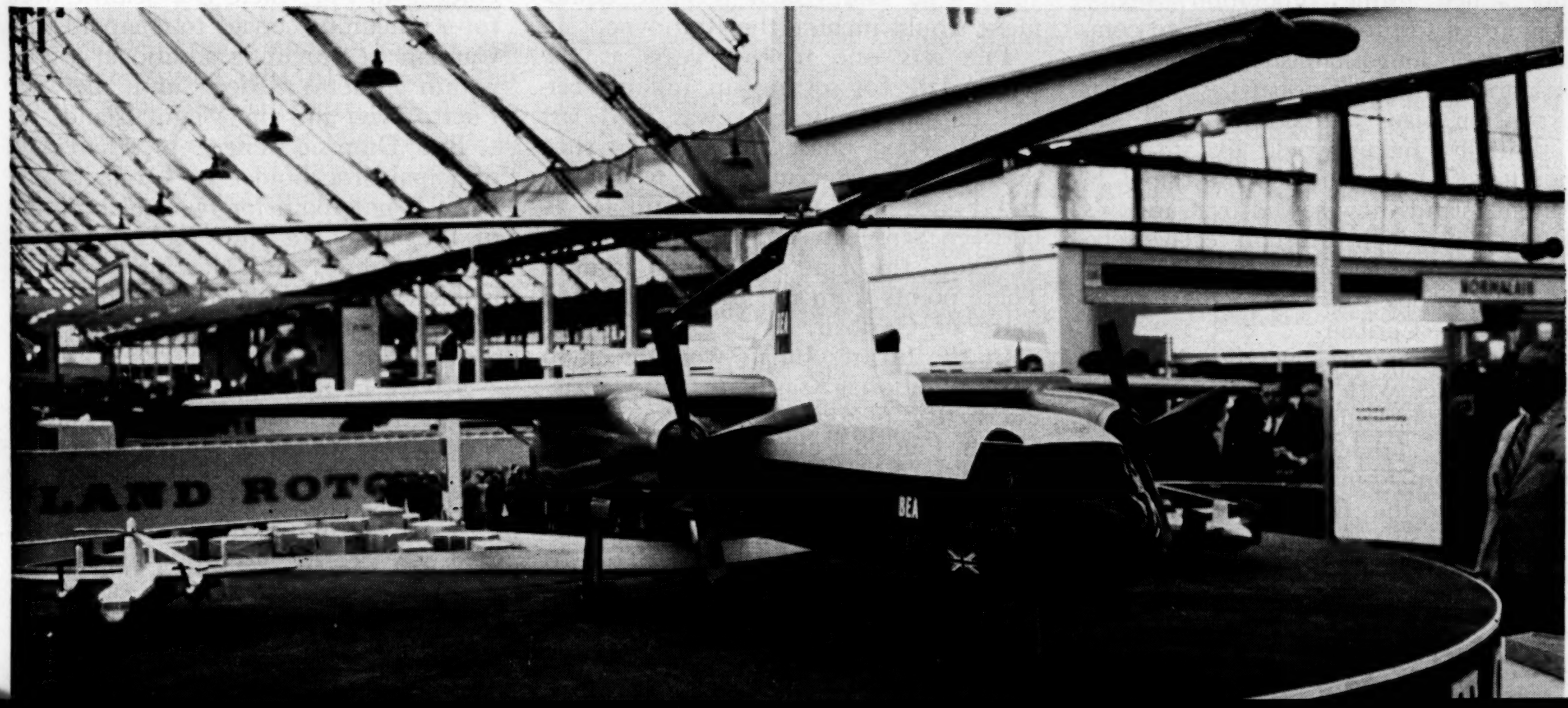


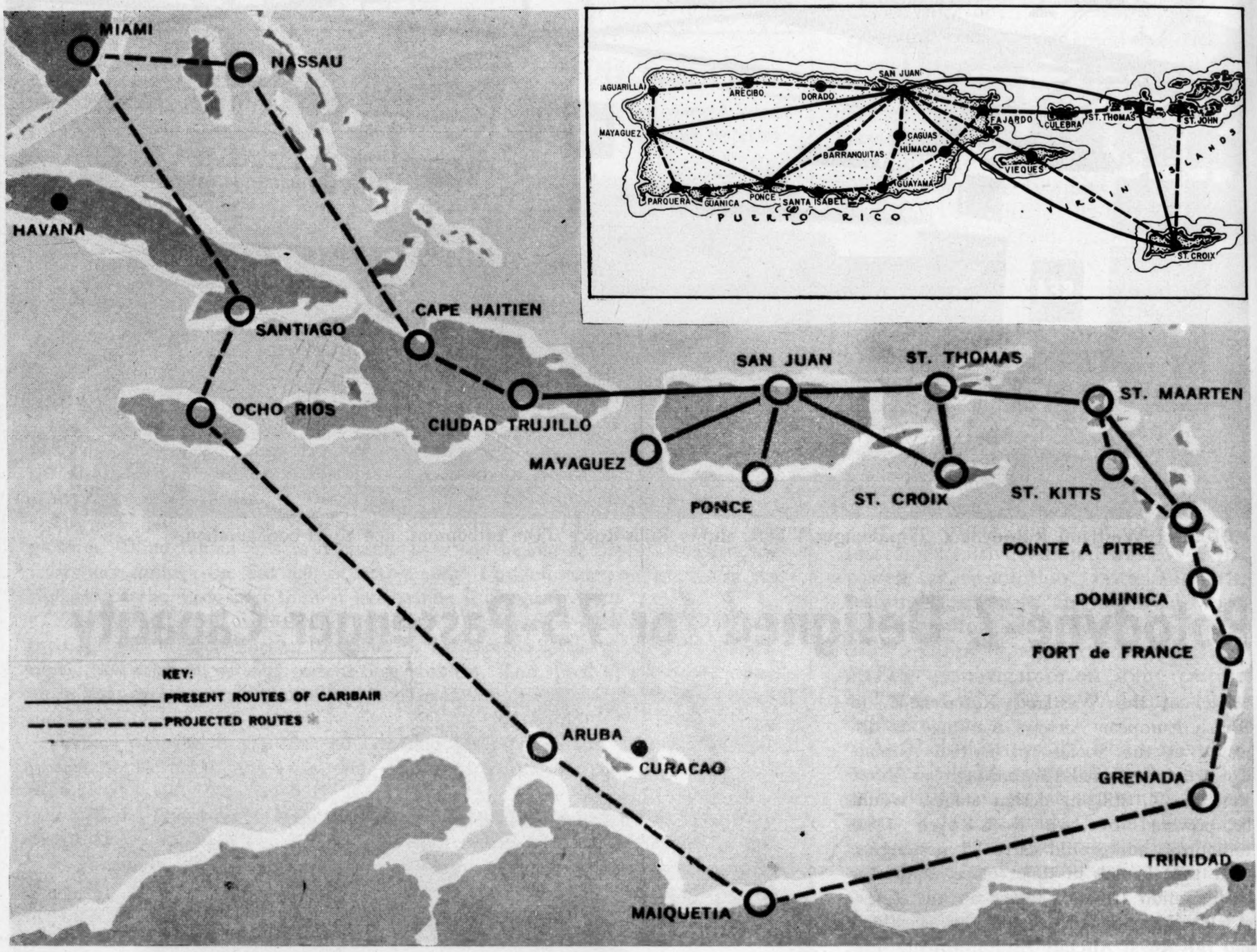
MODEL of Westland Rotodyne-Z 75-passenger VTOL shows Rolls-Royce Tyne turboprops, new tipjet configuration.

Rotodyne-Z Designed for 75-Passenger Capacity

Model of the Westland Rotodyne-Z, in British European Airways markings, is displayed at the Society of British Aircraft Constructors annual Farnborough air show. Rotodyne-Z, still in design stages, would be powered by two Rolls-Royce Tyne turboprops and would carry 75 passengers. Note the changes in tipjet noise suppressor configuration (right). Tipjet on the Z-version has been under test both by Westland and the Royal Aircraft Establishment. Engineers say this method probably will bring the Rotodyne's noise level down into the 95-db. area, comparable with large transports. The Rotodyne-Y, prototype now flying with Napier Eland turboprops, is fitted with vane-type noise suppressors to break up mass flow. The Y-version designed to carry a total of 62 persons including the crew, made two low passes over the Farnborough show, but did not land or take off, precluding evaluation of noise level at these critical operational times.






MIAMI
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CAPE HAITIEN
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ST. MAARTEN
MAYAGUEZ
PONCE
ST. CROIX
ST. KITTS
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KEY:
PRESENT ROUTES OF CARIBAIR
PROJECTED ROUTES
ARUBA
CURACAO
GRENADA
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MAIQUETIA
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SAN JUAN
FAJARDO
CULEBRA
ST. THOMAS
ST. JOHN
MAYAGUEZ
CAGUAS
BARRANQUITAS
HUMACAO
VIEQUES
PARGUERA
GUANICA
PONCE
SANTA ISABEL
GUAYAMA
PUERTO RICO
VIRGIN ISLANDS
ST. CROIX

ROUTES now flown by Caribair are shown in solid black lines. Dotted lines indicate route expansion the airline seeks for future development. Caribair's basic certificated route pattern includes only the Puerto Rican points, and St. Thomas and St. Croix in the U. S. Virgin Islands. New airline corporation, Indair, seeks authority to compete over this pattern initially (inset, black lines). Indair later would like to serve other points in area (dotted lines).

New Caribbean Carrier Maps Route Plans

By Glenn Garrison

New York—Growth of the Caribbean as a big-time tourist market has led to the formation of Indies Air, Inc. (Indair), a new airline corporation which—if awarded the routes—will seek to compete with long-established Caribbean-Atlantic Airlines (Caribair), which has expansion plans of its own.

Initially, Indair would like to serve points within Puerto Rico and the U. S. Virgin Islands now served by Caribair's DC-3s, but which will soon receive service by Napier-Eland-powered Convair 540 turboprops, four of which are being acquired by Caribair.

Indair's proposed operation involves initial service with leased DC-3s. The corporation recently signed a letter of intent to purchase five Rotodyne VTOLs from Kaman Helicopter, U. S. licensee for the British aircraft (AW July 10, p. 39). According to Sterling Pile, Jr., Indair president, the Rotodynes probably would cost about $2 million each. However, use of leased equipment would provide the flexibility to consider whatever equipment seemed appropriate to replace the DC-3s by 1965, Pile said. Such possible equipment would include the Rotodyne.

Pile sets one to two years as the target date for setting up Indair's certificate. Its application was filed last month. Next phase would be to start service between San Juan, Mayaguez and Ponce in Puerto Rico and to fly between San Juan and St. Thomas and St. Croix, the American Virgin Islands. These points form the basic certificated route of Caribair.

In the future, Indair would seek to serve additional Caribbean and intra-Puerto Rican points. A trunk route to Miami, Pile said, also is among possible long-range Indair goals.

Financing for Indair, according to Pile, is essentially completed. The capital is split 40% Puerto Rican, 30% Virgin Islands and 30% mainland U. S.

Indair and Caribair differ in their estimates of the market's ability to support two certificated U. S. carriers. According to Pile, there is a definite need for a scheduled service to compete with Caribair in providing additional service within Puerto Rico and between Puerto Rico and the Virgin Islands.

But Dionisio Trigo, president and principal stockholder of Caribair, says there is not room for two small airlines in the area. He cites the example of Aloha Airlines and Hawaiian Airlines, in his view a dilution of an inter-island market suitable for supporting a single carrier.

Service in the Caribbean area also is provided by a number of air taxi operators, whose value is also a matter of disagreement between Indair and Caribair managements. Pile said it would be "completely ridiculous" to attempt to enter the market on a non-certificated basis, since the mortality rate for non-scheduled and air taxi services is high.

Caribair, on the other hand, says there is a "thriving community" of air taxi operators providing good supplemental services in the area.

Caribair has been certificated since 1941, and has been operating without subsidy since 1955. Last year, it carried 387,077 revenue passengers, up from 334,731 in 1959. Operating income in 1960 was $3,507,782, and net profit after taxes was $198,563.

First of Caribair's 540s now is at Butler Aviation in Washington and should be in San Juan next month and in scheduled operation in December, Trigo told Aviation Week. Second of the 55-passenger turboprops is expected in January, the third in February, and the final aircraft should be delivered by the end of 1962, Trigo said.

The aircraft are being acquired under a lease-purchase agreement, and Caribair expects to buy them. Financing already has been arranged for the purchase, Trigo said. It totals $4.5 million for the four aircraft plus spares.

Runways Short

Runway lengths present a problem for anything larger than a DC-3 at some of the points served by Caribair. Most important is St. Thomas, where the present runway is 4,200 ft. However, Trigo said he has been "assured" by authorities that a 500-ft. extension will be completed by the end of November.

For 540 operation, runway problems also exist at Ponce and Mayaguez in Puerto Rico. These strips are 3,200 ft. and 3,620 ft. respectively. According to Trigo, negotiations are under way for extension of these runways but results are not expected immediately.

Caribair also serves Ciudad Trujillo in the Dominican Republic from San Juan, and flies to St. Martin (Maarten), an island which is owned jointly by France and Holland. It also recently was advised it could serve Guadeloupe in the French West Indies and plans to inaugurate service soon. Caribair has been authorized by CAB to serve this point since early last year, but had to wait for U. S.-French negotiations to clear the service. Ciudad Trujillo is served under a temporary certificate, which has expired and is up for renewal; St. Martin is served under an exemption. So Caribair's basic certificated route is the intra-Puerto Rico and Puerto Rico-Virgin Islands segments. This totals 236 route miles, Trigo said, and makes Caribair by far the smallest U. S. local service carrier. Its routes presently are served by a fleet of seven DC-3s.

Caribair has filed for various route expansions, including points in the West Indies and a route to Miami (see map). Many problems exist in winning rights to serve Caribbean points, however, in view of the various foreign governments involved and the necessity for intergovernment negotiation of traffic rights.

Trigo would like to see the CAB either undertake a Caribbean service case or include the Caribbean in its investigation of South American route structures. The Caribair official greatly prefers the second alternative, feeling that no meaningful distinction exists between the Caribbean and Eastern South American areas.

Caribair is counting on route expansion and traffic increases to justify its acquisition of the turboprop 540 aircraft, Trigo said. Replacement of DC-3s was necessary partly because visitors flying into the area by jet want something a bit more modern in their short-haul travel too, he said.

To illustrate the expensive high-frequency, short-haul character of the route pattern, Caribair's first 540 is scheduled to provide five daily round trips between San Juan and St. Thomas, plus three round trips between St. Thomas and St. Croix, yet the total utilization of the aircraft will be only five hours. The turboprop will cut time between San Juan and St. Thomas from 37 min. to 22 min., and from St. Croix to St. Thomas from 25 min. to 18 min.

Caribair can be counted on to fight Indair's application for competitive service. Caribair presently is fighting a formidable opponent, Pan American, in a PanAm application to provide local service between St. Croix and Antigua, Trigo said.

Trigo predicted an annual traffic increase for Caribair of at least 20% over the next several years. Increases have been running at about that level in recent years.

The area has been growing fast and will continue to grow as a big tourist market, both Indair and Caribair agree.

Figures acquired by Indair in its study of the market potential indicate that the number of visitors to Puerto Rico has grown almost 350% since 1950 to a total of 343,737 in Fiscal 1959-60. Their expenditures increased to over $50 million in 1960. Virgin Islands tourism has grown from a 1950 visitor total of about 15,000 to 204,100 in 1960. Of 164,700 visitors to St. Thomas and St. John in 1959-60, the figures show 85,000 handled by Caribair, 49,000 by cruise ships, 2,700 by British West Indies Airways, and 28,000 by armed services, private yachts, and regular steamers.

Tourist Accommodations

Hotel accommodations in the area have kept abreast of the expansion, the Indair study indicates. In 1958 and 1959, Puerto Rican and Virgin Islands hotel facilities almost doubled (Caribair however, believes hotel development in the Virgin Islands is behind the demand).

Tourist expenditures in the American Virgin Islands totaled $24,780,000 in 1959-60, according to the Indair study.

Despite the gains to date in development of the area as a tourist resort, Indair feels that the Caribbean is in its infancy and has great further potential. Among the factors which will provide inter-island airline business will

Bristol 208, AW 681 STOL Designs Studied

London—Competition for Royal Air Force tactical transport to replace the aging Blackburn Beverley with an STOL airplane now centers on two British designs, with a British-built Lockheed BLC-130 as a backup to British Aircraft Corp.'s entry (AW June 26, p. 32).

The airplanes are the Bristol 208, submitted by BAC, and the Armstrong Whitworth 681, both powered by four Bristol Siddeley BS.53 Pegasus lift engines. Proposals both include a Mk.2 version for VTOL, with capacity for wingtips to take pure lift engines. Bristol Siddeley has designed a new lift engine with the competition in mind.

Ministry of Aviation, which is evaluating the projects, is due to report to Air Ministry by Sept. 30 and selection should be made by the end of October. Since the two British designs are quite similar, selection will be primarily political and based on necessity for work within British Aircraft Corp. and the Hawker Siddeley Group, which owns Gloster Whitworth, builders of the AW 681.

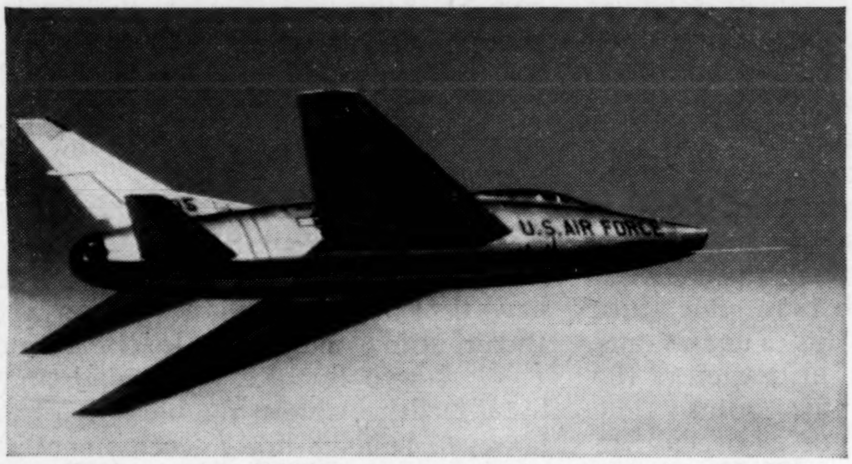
Major difference is in podding of the four Pegasus engines. Bristol 208 will carry the powerplants in double pods and AW 681 has them in four separate pods. The 208's landing gear will be in the aft pods, but the AW 681 gear is encased in fuselage blisters.

The Lockheed BLC-130 would be British-built by BAC, and would have Rolls-Royce Tyne turboprops as the propulsion units. However, the provisions for VTOL follow-ons put the Bristol 208 and AW 681 in the foreground for final selection.

There is considerable Air Ministry and parliamentary support for the Lockheed design as an interim aircraft, to fulfill RAF commitments until the new plane is built. British designs also fit the NATO STOL transport competition.

REPORT:

Shell reports on three new lubricants that improve aircraft operation—and two new developments that improve aircraft service



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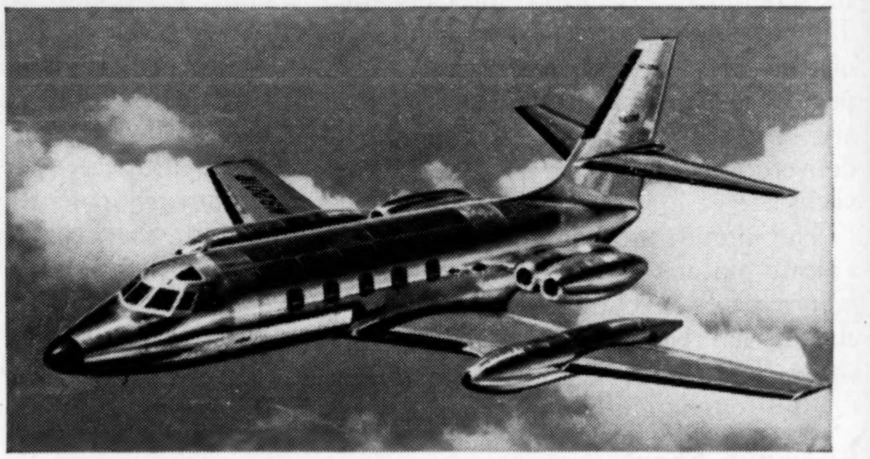

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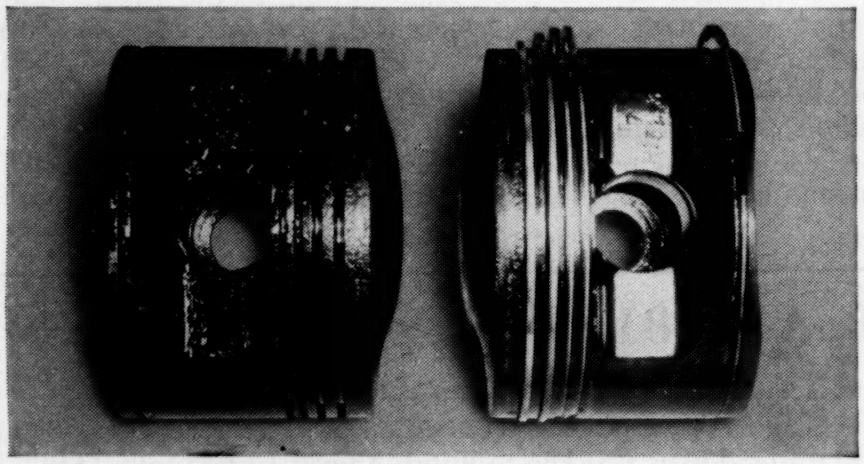

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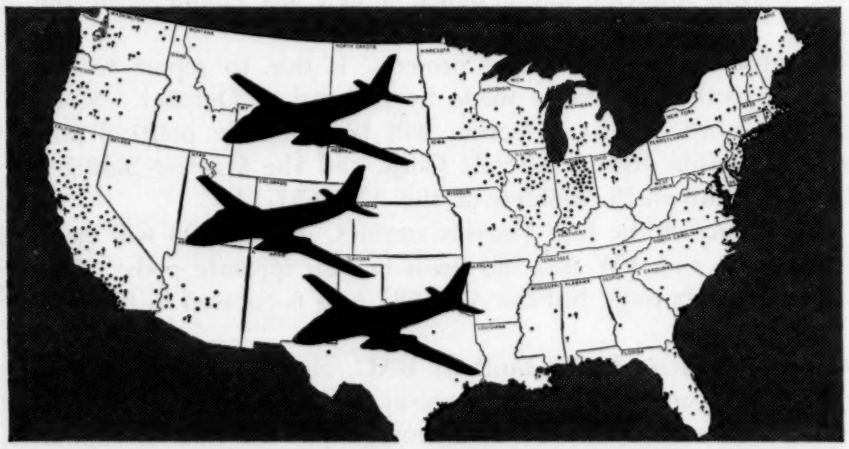

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be the expansion of jet service to the area by long-haul carriers from the U.S. Another factor is the CAB decision in the Southern Transcontinental Case, opening new routes to Florida from the U. S. West Coast and thus providing new markets for the Caribbean. Projecting future traffic, the Indair figures show 441,829 passengers in 1961 between the Puerto Rican points, between San Juan and the islands, and between the islands. By 1967, the projected total is 884,229. Indair estimates its own share of this traffic at 50% in 1967.

While the market is basically tourist, the area also is growing residentially, providing another traffic category.

Indair's hopes for the future include possible expansion through purchases, mergers or route acquisitions. In its view, potentially profitable Caribbean routes are being flown by some carriers unprofitably. Outright purchase, merger or acquisitions of island-hopping segments of some of the larger airlines are considered as possibilities.

House Group, Senate Are Divided On Future Role of Supplementals

By George C. Wilson

Washington—Role supplemental air carriers will play in the U. S. transport industry may be decided in the closing days of the 1961 session of Congress.

The issue pits the Air Transport Assn., representing scheduled airlines, against the Independent Airlines Assn. and Supplemental Air Carrier Conference, representing the supplementals. Both sides have been lobbying hard for their position. The issue also, in a sense, pits Senate against House.

Basically, the ATA feels supplementals should be restricted to charter operations designated by the Civil Aeronautics Board. The association contends that letting supplementals fly individually ticketed passengers would worsen the already bad financial condition of the scheduled carriers.

Citing these financial troubles, Stuart G. Tipton, ATA president, told the Senate aviation subcommittee recently that "this is no time for the Congress to enlarge the operating authority of the supplemental air carriers. . . . The most Congress should do at this time would be to amend the act so as to make clear that the Board could issue certificates for all-charter operations."

Previous court decisions invalidated CAB authority to let supplementals fly. The supplementals now operate under temporary authority embodied in an act of Congress scheduled to expire March 14, 1962.

Clayton L. Burwell, president of the IAA and SACC, countered that the supplementals have more money troubles than scheduled carriers. He said revenues have declined, bankrupting dozens of supplementals. He added that even if the supplementals won all the domestic charter business, it would amount to less than 1% of the scheduled airlines' total domestic revenues.

Congress, according to Burwell, should give permanent status to supplementals so they could develop the markets largely ignored by scheduled airlines. He said supplementals, being under temporary authority, cannot persuade lenders to advance the money needed for new equipment. "We cannot temporize longer with the attitude of the government toward us," Burwell said in asking for legislation.

The Senate subcommittee, after an unusually lengthy study, wrote a bill giving supplementals the type of permanent status they seek as well as broad charter authority. The bill also empowers the CAB to allow supplementals to fly individually-ticketed passengers between specified points as long as this "will not result in significant diversion of traffic" from the scheduled airlines.

A further provision would authorize the CAB to let supplementals fly over scheduled carriers' routes for as long as 90 days during peak traffic periods.

The parent Senate commerce committee, in reporting this bill to the floor, said supplementals "have been instrumental in expanding the horizon of air commerce. To a large extent they are responsible for the tremendous expansion in the charter field which has taken place in the last few years. They pioneered the military contract business and the airfreight or all-cargo field. They were the first to develop aircoach travel and as a result opened a vast new field of air transportation by encouraging people to travel by air who had never done so previously." The report concluded that "supplemental air carriers have a vital role to play in meeting the air transportation needs of this country."

With surprisingly little debate, the Senate passed the committee bill Aug. 25 with minor changes. ATA then focused its attention on the House Interstate and Foreign Commerce Committee. That group last week reported a bill less liberal toward the supplementals than the Senate measure. ATA favors the House version while the supplementals are fighting for the Senate measure.

Although the House bill authorizes supplementals to fly individually ticketed passengers during rush periods over scheduled carriers' routes, it does not contain the Senate-provision allowing supplementals to offer such service on a more regular basis. Also, the house bill does not define charter service, leaving the definition up to CAB.

The House bill, according to current strategy, will be taken up under suspension of the rules. This procedure requires approval of two-thirds of those voting and forbids amendments. Once the House acts, the hottest lobbying on the bill to date will center on the Representatives and Senators trying to work out a compromise measure. The bills are so far apart that there is a good chance the conference could be postponed until next year.

ATA is especially disturbed about the definition of charter in the Senate bill. The definition would enable a travel agent to charter an airplane and fill it with passengers on an all-expense package tour. Unlike the present situation, the passengers would not have to be members of the same organization.

Leo Seybold, ATA vice president, told Aviation Week the package tour exemption could lead to a breakdown in the whole airplane transportation system. He said CAB would be "scarcely able to control" such abuses as phony travel agents selling so-called all-expense tours at reduced rates over routes served by trunk carriers.

Seybold said the individually-ticketed passenger authority in the bill also might result in direct competition for the scheduled carriers. As for allowing supplementals to serve over regular routes during rush periods, Seybold objected to preventing scheduled carriers from diverting aircraft from less busy routes to fill the gap.

In answer to these and other arguments, backers of the Senate bill such as Chairman A. S. Mike Monroney (D.-Okla.) of the Senate aviation subcommittee contend there are adequate safeguards. They say supplementals, with their promises of bargain rates for overseas travel, would serve as a valuable yardstick for the industry and possibly develop a new market of passengers.

Chairman John Bell Williams (D.-Miss.) of the House aviation subcommittee told Aviation Week the supplemental legislation was the most complicated measure he has worked on since coming to Congress. He said both sides, despite the differences in the bills, had indicated to him that they could live with the House version. Even so, he said the conference may be postponed until next year.

The legislation which emerges from the House-Senate conference is expected to profoundly affect the complexion of the air transport industry.

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AVI

British Stress Mach 2.2 Airliner's Assets

By Herbert J. Coleman

London—Two leading airline executives—one U. S., the other British—last week warned the Anglo-American Aeronautical Conference here against moving too fast toward freezing a supersonic transport design.

William Littlewood, vice president-research, American Airlines, said the supersonic transport need is "not too great" and that timing is of utmost importance, adding that "to plunge into this design would be an indication of immaturity." He backed intensive further study of configurations, costs and in particular the effects of cosmic radiation upon crew and passengers. Littlewood, describing himself as a dissenting member of Project Horizon, said he considered U. S. concentration on Mach 3 design as an "ill-advised project," noting that North American Aviation, builder of the B-70 Mach 3 bomber, is not ready to discuss a supersonic transport specification until after 1964.

Time Requirement

J. C. Dykes, director of BOAC Associated Companies, said the airline questions whether designers should build a Mach 2.2 just because it is feasible. He stressed the need for time to study the entire supersonic transport system concept as an alternative to a "disastrous mistake." BOAC Chairman Sir Matthew Slattery has previously referred to the SST as an "infernal nuisance" (AW Aug. 7, p. 40), but has since implied that BOAC will go along if competitive reasons force the issue.

Dr. A. E. Russell, chief engineer of Bristol Aircraft, pressed the semi-official British position that a Mach 2.2 airplane is more feasible and practical than the Mach 3 type preferred in the U. S.

He said: "Many people in this country are puzzled and confused by the apparently strong interest in the United States for the trisonic airliner."

Dr. Russell's team has completed the BAC supersonic Mach 2.2 transport design (AW Sept. 4, p. 37) and the next move is up to the government. Still an unknown factor is possible cooperation between the French and British governments on design and construction. Talks have been on an on-again, off-again basis for some time, and are complicated by internal disagreements in French industry on final configuration.

Although the French position is that technical and financial cooperation is necessary to compete with a U. S. design, Sud Aviation and Dassault are still trying to agree on a design. Sud's project is aimed at its Super Caravelle (AW June 5, p. 40) with external underwing engines, but Dassault's plan is essentially a large Mirage IV with the powerplants buried, to avoid asymmetrical shock patterns.

Britain's design, as proposed by BAC, is primarily a slim, highly swept delta that will much resemble the wing of the Handley Page 115 research plane flown at Farnborough air show (see pp. 78, 79). It will, however, have no tail and will carry 130 passengers at 60,000-ft. altitude.

Dr. Russell said that titanium for a supersonic transport shell has "certain attractions" in that material deterioration due to temperature is considerably postponed and certification testing simplified. He added that structure weight also could be reduced.

On the other hand, Dr. Russell pointed out, material and production costs are substantially higher and there is comparatively little experience in the use of titanium on civil transports. He contended that the extra costs for complete adoption of titanium for the main fuselage would be nearly $3 million per aircraft.

Stainless steel, which has a very high cost, is relatively inefficient unless used in honeycomb form, he said. It probably would be used only in airplanes faster than Mach 3, where temperatures would be too high even for titanium.

Another factor is in airplane systems, in view of rapidly rising temperatures with higher speeds. In the Mach 2 range, the airplane can use existing kerosene fuels. For Mach 3, however, Dr. Russell said, kerosene fuels must not be allowed to reach bulk temperatures above 70C, or a new fuel must be developed. Considerable tank insulation also will be needed.

Mach 3 powerplant fuel, in his opinion, must have a higher thermal stability, lower volatility, higher specific heat, low freeze point for subsonic conditions, low luminosity and high energy content. Dr. Russell believes refinery processes would increase this fuel cost by at least 10%.

In the realm of operating costs, Dr. Russell said seat-mile costs for a supersonic transports, as compared with subsonic jets, will be about 20% higher.

He explained: "Before inferring that direct operating costs of supersonic aircraft will necessarily be higher than the best achievable by current subsonic aircraft, it should be remembered that existing civil types have derived great benefit from the large production of selected military forebears. This situation seems unlikely to arise in the future so it may not again be convenient to write off development and other expenditures."

In another discussion, George C. Prill and Harold Hoekstra, of Federal Aviation Agency, warned that the costs of carrying reserve fuel in supersonic transports will be prohibitive and to maintain all-weather schedules, automatic landing and takeoff devices are the final answer. International cooperation to develop a single standard is essential, they stressed.

They said international cooperation again is vital in maintaining the supersonic routes between, for example, London and New York, adding:

"The traditional concept of airworthiness is not enough. This thinking must be expanded into systemworthiness." The aircraft must be systemworthy, the crew must be systemworthy, and so must airports, navigation and traffic control, weather information, communications and all other components."

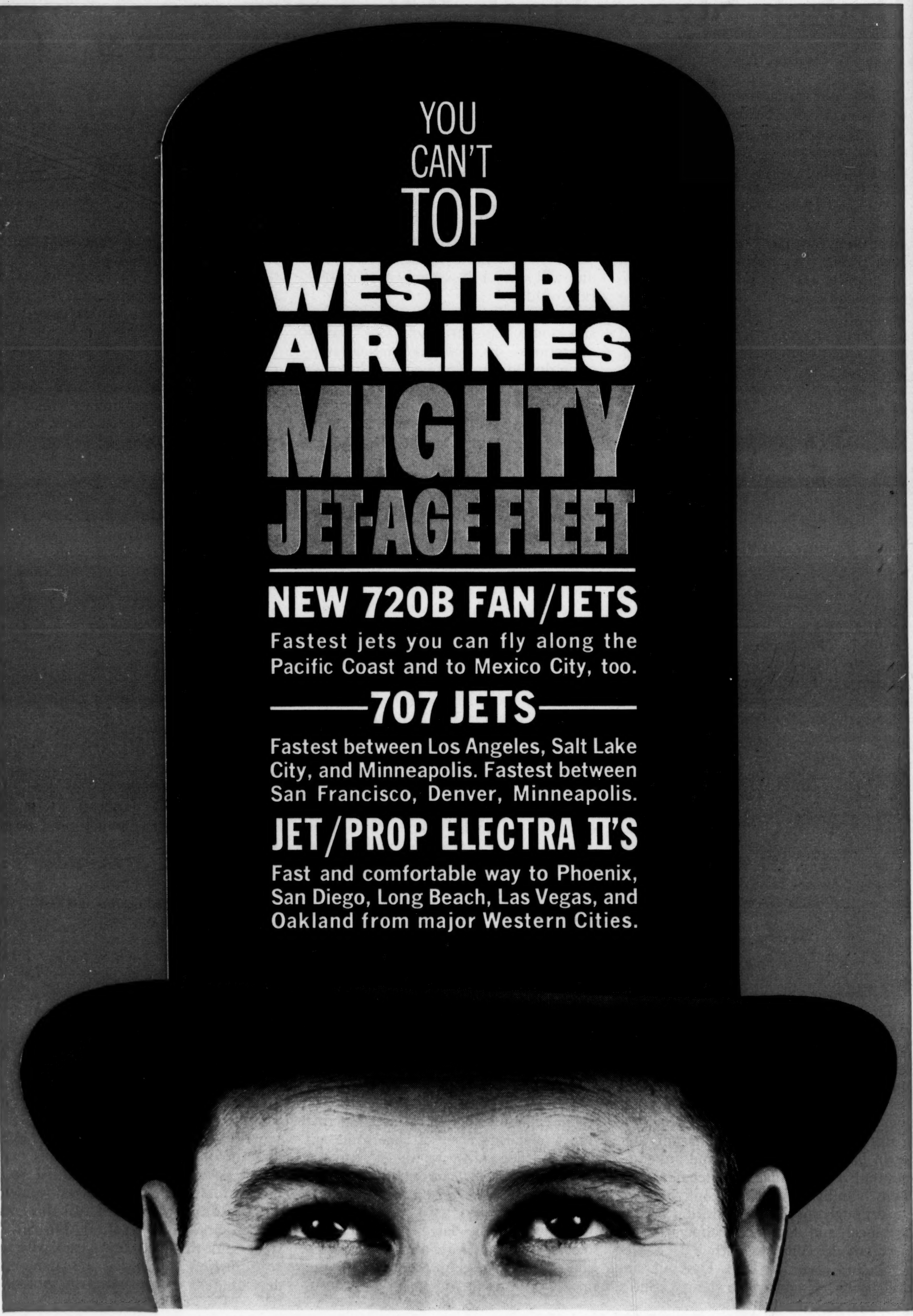
Prill and Hoekstra feel that in the 1970s the supersonic airplane will carry economy-class passengers almost exclusively, "with a special set of seats forward for motion picture stars. . . . It is almost axiomatic that the only people who buy first-class tickets are those traveling on expense accounts. Those few who have enough wealth to travel first class on their own are not statistically important in the field of aircraft design."

One operating problem will be landing speeds, since it should not be expected that runways will be lengthened for supersonic transports. With this in mind, FAA has conducted a series of arresting gear tests, involving a Convair 340 fitted with a tail hook engaging fluid-filled tubes for energy absorption, and has scheduled a series of follow-on tests using a Boeing 720 jet transport.

Noise Factor

The noise factor involving supersonic transport operations demands intense study, according to R. G. Thorne, senior scientific officer at the Royal Aircraft Establishment, in view of the fact that "noise levels produced by modern aircraft engines are near the limits of public endurance."

The conference's 49th Wilbur Wright Memorial Lecture was presented by Dr. Abe Silverstein, NASA director of space flight programs, who urged development of expanded techniques for return of space test vehicles and spacecraft to earth. Until this complex parameter is resolved, Dr. Silverstein said the next few years will see continuation of heavy research and development emphasis on the ground.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SHORTLINES

▶ **Civil Aeronautics Board** will hold a public hearing on the crash of a Trans World Airlines Constellation that killed 78 persons shortly after takeoff at Chicago's Midway Airport on Sept. 1. The hearing will take place at the Midway Hotel in Chicago at 9:30 a.m. Sept. 27.

▶ **Delta Air Lines** on Oct. 1 will add a daily DC-8 jet flight on its Atlanta-Birmingham-New Orleans-Los Angeles route and a nonstop New Orleans-Los Angeles jet flight, originating in New Orleans. The airline will begin Convair 880 service between San Francisco and Philadelphia via Atlanta, New Orleans, and Dallas on Oct. 31.

▶ **Federal Aviation Agency** has ordered 100 new direction finders (DFs) valued at more than $1.7 million for installation in selected FAA Flight Service Stations and airport control towers without radar facilities. The direction finders use a doppler principle and cover the VHF and UHF bands. Most of the DF equipment will be installed in Alaska, the western states and some northeastern states.

▶ **Iberia Air Lines** has begun service with DC-8 jets on its Madrid-San Juan-Caracas and Bogota route and on its Madrid-Bermuda and Mexico route. The airline has shifted its Saturday DC-8 New York-Madrid jet flight to Sunday, effective through Oct. 31. Departure and arrival times remain the same.

▶ **Irish International Airlines** reports revenue passenger traffic across the Atlantic for July increased 58% over July, 1960.

▶ **Pan American World Airways** has received Civil Aeronautics Board permission to suspend service to Camaguay, Cuba, for an indefinite period because of the political situation in Cuba.

▶ **Piedmont Airlines** reports net income for the first six months of this year at $76,131, compared with $506 for the same period last year.

▶ **Radar Traffic Information** Service now undergoing a 90-day evaluation at New York's Idlewild Airport and Washington National Airport has drawn a favorable response from users. The service is designed to keep pilots on VFR informed of pertinent traffic. National Airport reports an average of 115 calls per day and Idlewild reports about 35.

AIRLINE OBSERVER

▶ Twice-delayed certification program of the Boeing-Vertol 107 twin turbine helicopter is now scheduled for Nov. 25 completion. First delay of about two months primarily involved gear box difficulties, with transmission components not meeting the required degree of hardness. More recent delay, which will run about six weeks if schedule is met, primarily was caused by need to strengthen swash plate lugs and fitting elements in the upper control system. Tests at 111% of V_{NE} speed showed control system loads in excess of what had been anticipated. Fix also involved shifting the rotor blade CG forward by moving the balance weights. New York Airways was scheduled to receive its first 107 last week, an unmodified aircraft which later will go back for changes. Originally, the carrier was to get its first aircraft early this summer.

▶ **Trans World Airlines financing for its Caravelle order (AW Sept. 11, p. 41) is likely to include General Electric participation. GE has taken part in previous airline financing for engines. One of the latest examples is the CJ-805 turbojets that power Northeast Airlines' six Convair 880s. Northeast leases the aircraft from a company set up specifically for this purpose, but GE preferred to hold the engine lease itself.**

▶ International Civil Aviation Organization was expected to concentrate on a discussion of dual doppler radar as a primary means of navigation at its Fourth North Atlantic Regional Air Meeting which opened in Paris last week. ICAO has consistently criticized existing long-range navigation aids as failing to provide accurate position fixing.

▶ **United Air Lines expects to phase out its Vickers Viscount turboprop equipment in early 1964 as it takes delivery on the Boeing-727 short-range turbojet. Vickers fleet, acquired in the merger with Capital Air Lines, now totals 41 aircraft, all of which will remain on short-haul routes in the East because maintenance facilities are located at Washington, D. C.**

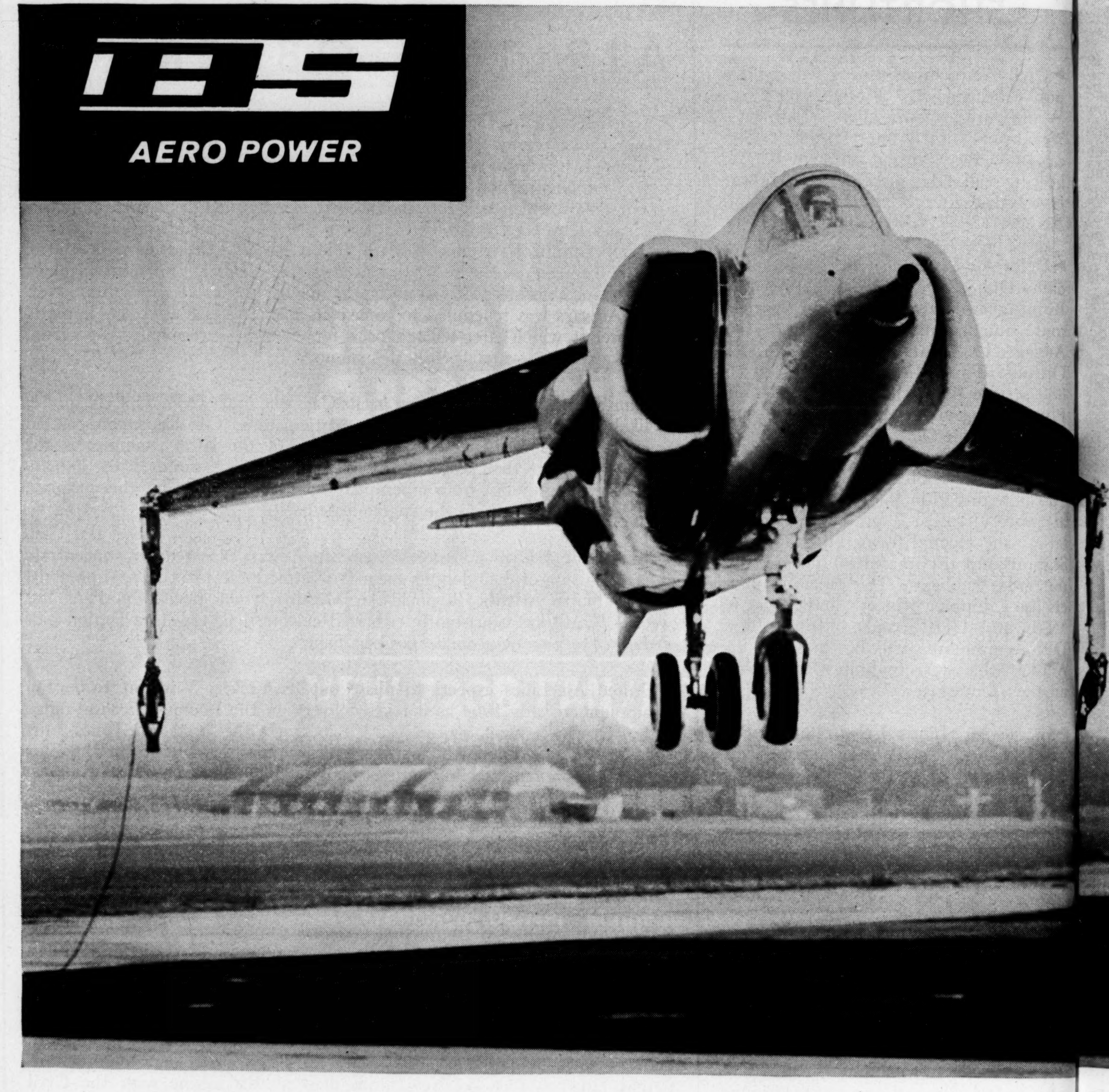
▶ Private and commercial pilots who learn to extricate themselves, on instruments, from threatening weather conditions may have "Blue Seals" affixed to their licenses, according to an announcement last week by the Federal Aviation Agency.

▶ **Piedmont Airlines is completing financial arrangements for the purchase of 17 Martin 404s, plus spare parts, shop and ground equipment and a simulator, from Trans World Airlines. If approved by the Civil Aeronautics Board the agreement would permit phasing out of 14 DC-3s.**

▶ Delta Air Lines hopes to offset the increasing rise in airfreight pickup and delivery costs by providing the airline industry's first "door-to-door" airfreight rates on Oct. 6. New tariffs filed by the airline with the Civil Aeronautics Board will lower over-all shipping costs to include both air transportation and freight forwarding costs. Delta estimates savings may go as high as 40% for some shippers.

▶ **Breguet will participate in the production of Fokker F-27 turboprop aircraft under an agreement signed between the French and Dutch airframe companies. Both manufacturers already cooperate in the production of NATO maritime patrol aircraft for the Atlantic. Breguet will produce the main fuselage components for the F-27. Production is expected to last two years as Fokker has a backlog of 105 orders. The agreement is viewed as another step toward closer coordination of production among Western Europe's aircraft industry.**

▶ Russia's Aeroflot has placed four Ilyushin Il-18 turboprops on the 1,675-mi. route from Moscow to the mining center of Karaganda in the Kazakh Soviet Socialist Republic. The Il-18s make the run in 4 hr. compared with 12 hr. for the piston engine Il-14s which they replaced.



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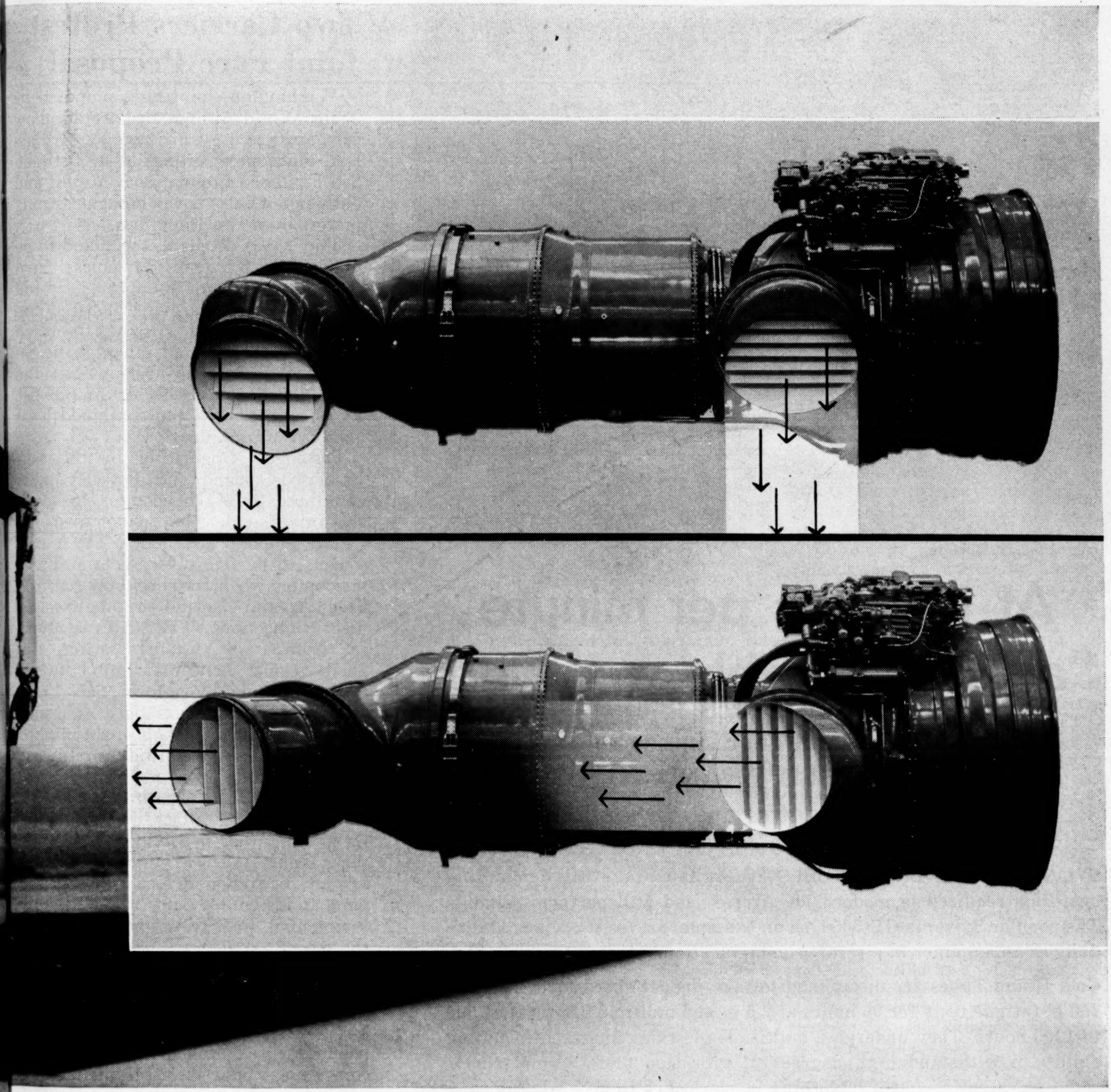

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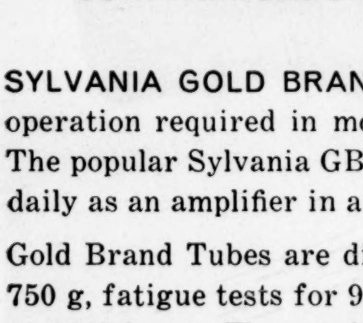

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Two Carriers Protest Joint Fare Proposal

Washington—Joint fares proposed by Trans World Airlines that would allow passengers to use San Francisco & Oakland Helicopter Airlines to fly between San Francisco International Airport and outlying points have brought strong protest from two trunklines.

The TWA proposal, scheduled to go into effect by Sept. 24 unless Civil Aeronautics Board disapproves, would allow a passenger arriving at San Francisco International Airport to reach downtown points, and others in neighboring Berkeley and Oakland on the SF&O helicopter system, for a flat $3.50 reduction in the combined local and TWA fares.

Passengers originating in the San Francisco-Oakland and Berkeley areas could use SF&O helicopters to reach the airport under the same terms.

The proposal also allows TWA passengers to fly free of charge on SF&O helicopters when traveling between San Francisco and Oakland airports to make flight connections. TWA cites as a typical example of customer savings the $6.50 regular helicopter fare between the airport and downtown San Francisco. With joint fares the cost would be a $3 charge for an eight-minute flight. A half-hour taxi ride would cost $6, TWA said.

United Air Lines, with Western Air Lines concurring, attacked the proposal on grounds that it would not generate new traffic and was unfair to other carriers, persons and localities. At the same time, United said, it was unduly preferential to TWA customers using the service.

According to United, if TWA prorated revenue from the joint fare, that airline would have to absorb an average loss of $2.50 per passenger on the $3.50 reduction in combined fares. The helicopter line would absorb the remaining $1.

Fearing that it would have to adopt the joint fare if CAB approved, United said it would have lost $5.3 million on its 2.1 million passengers carried into and out of the San Francisco area during the year ended June 30 if all passengers had used the service. If half its passengers had used the joint fares, United figures its loss would have been $2.6 million.

United said the $2.50 it would have to absorb under the plan "virtually equals" its domestic operating profit of $2.61 per passenger for Fiscal 1961.

United also feared the joint fares would be most popular with short and medium-haul customers, where the amount the airline would have to absorb would take a proportionally bigger bite out of fares.

SPACE TECHNOLOGY

Dornberger Sees Space as Military Area

(Because of the growing concern over an adequate military role in the national space program Aviation Week *is publishing the full text of a report recently presented by Dr. Walter Dornberger, vice president Bell Aerosystems Co., on "Military Utilization of Space." This paper was initially presented to the second symposium on rocket testing in simulated space and high-altitude environments at the Arnold Engineering Development Center, Tullahoma, Tenn.)*

By Dr. Walter R. Dornberger

I am convinced that space technology in this country is poised on the brink of major technological and political changes that will rapidly alter its complexion during the next few years. These changes will have an enormous impact on the American people as a nation and especially on the aerosystems industry, on which the burden of maintaining our technological pace will fall.

This change means the shifting of the center of gravity of our space effort to the military area. It seems that we as a nation finally realize that we are in a deadly military race with our opponent, the Russians. It seems that something drastic has to be done and has to be done fast.

I don't know why it always has to look as if we as a nation never use the bold approach, that in technology we never are the first, that we always wait until someone does it first and proves a point before we do it better and more accurately, and also with more complexity.

Technological Race

We live now in the technological age, in the midst of a technological race. Not only in space, but in every area of science. We have to do it first, and we have to do it best. Maybe because we have been trained for centuries as businessmen who don't want to take a risk and who don't want to lose money, we analyze and study too much before we act.

We have no time for that any more. And we have no excuse either. We have been warned a long time ago.

When we look back at the first years after the last war, there were enough prophets, and even experts, in this country who knew their field and predicted the coming importance of space for our national survival.

But who listened and who did something about it? Instead of discussing the space age problems in thousands of meetings and analyzing everything almost to death, we should have approached the possibilities boldly, would have recognized certain areas of importance more realistically, and most important of all, we should have used more common sense in making decisions.

We talk a lot about the famous "lead time," meaning the time from the start of the development of something until its final operational use. This lead time is small, very small compared with the lead time from proposal of an important concept to the moment a decision is reached to get going. Here is an area where much could be done in the interest of our country. It sometimes looks to me as if we analyze and study a proposal, vital for our survival, not with the ultimate goal in mind of how to do it, how to do it fast and in the very best way, but in order to find someone who finally tells us that it cannot be done, thus relieving us from the responsibility to have to spend a tremendous amount of money and to have to act immediately.

For example, several months ago, out of a clear sky there suddenly appeared in the papers the newly discovered dust cloud of the moon enveloping our globe at 100 mi. altitude, which assumedly will prevent men from space flight. Many came to the conclusion, "Here is a new obstacle—let's wait before we go on," despite the fact that almost 100 satellites and missiles already had passed unharmed through this dust cloud. Before that, we had hundreds of other obstacles.

I remember the question: "Is there any use for man in space?" At a meeting in Denver, not more than three years ago, there was a group of panelists at an Air Force Office of Scientific Research meeting who had to answer this question, and who came to the almost unanimous conclusion that the only purpose of man in space will be to prove that he is not needed at all. Today most of these panelists are ardent promoters of the man-in-space program.

The last war, as far as outstanding technological features are concerned, brought us nuclear energy and modern rocketry—two achievements which opened the door into a new and different future and which changed, or will change, mankind's thinking and fate even during our lifetime. To ground, water and air a new dimension has been added and is now open to man's endeavors—space.

DR. WALTER R. DORNBERGER

Four Basic Steps

A little common sense would have made our leading people realize that basically, at the beginning of the coming space age, only four great achievements were necessary to get a head-start:

- **Orbital speed.**
- **Escape velocity.**
- **Reaching a heavenly body.**
- **The safe return of a manned,** maneuverable space ship to earth.

Because we did not recognize in time this coming new era in the life of mankind, we flopped in the first three of these achievements, and I'll bet we will flop in the fourth one, too. Despite Gagarin, Titov, Shepard and Grissom, the fourth achievement has yet to come. With due respect to what these early astronauts did, they were only payloads in space capsules which had no maneuvering capability. This feature, maneuverability, is still missing.

And what is the outlook for the future? What will be the next three big achievements in space?

- **First, rendezvous.**
- **Second, trip around** the moon and return.
- **Third, soft landing** on the moon and return.

Will we fail here also? I don't know, but I am a little bit pessimistic. With more common sense we, and especially the military men, should have realized much sooner than years after Sputnik that space can and will certainly be used for military purposes. For the thinking military man, space is nothing but an extension of his field of operation, an extension in the vertical direction. I am not talking about ballistic missiles, these are not true spacecraft or space vehicles. Ballistic missiles fired through space are no more spacecraft than bullets and shells fired through the atmosphere are aircraft.

I am talking about spacecraft in orbits, manned and unmanned, maneuverable, accurate, reliable and recoverable.

Why Go Into Space?

The question is always asked: "Why should we go into space at all—is there really any use for space?" There are too good reasons for doing it:

- **For political or prestige reasons.** We live in a cold war. Here, victory is not won on a battlefield but through scientific and political achievements. As far as the scientific and technological achievements in space are concerned—and I think we want to be the leader of the nations of the world—let National Aeronautics and Space Administration aim at them. Let NASA go to the moon, let them go to Mars, let them go to Venus. It seems to me that presently there is no military interest in far outer space.

- **For military purposes.** Offensive and defensive weapons will always be developed. Offensive and defensive weapons together form a vicious circle. Any offensive weapon will soon find its counterpart in a defensive weapon. Then we have to go faster, have to go higher with our offensive weapon systems until the circle is closed again.

Now we have a new area available, a new dimension in which we can operate. We suddenly can go much, much higher and much, much faster. We can go with our weapon systems up to 450-mi. altitude without running into any unknown trouble caused by this new environment. That is about 10 times as large an area as we are operating in now.

Military Superiority

Ground, water and air, in which of these media do we really have military superiority?

On the ground? I don't think we have superiority. The Russians have more manpower and more soldiers. Adding the population of China, the communistic world has almost one billion people, and that is a lot of people, and they have them very well equipped for war on the ground.

On the water? I doubt this also. I think the Russians have around 500 submarines and they have underwater-launched vehicles—ballistic missiles—the same as we. They may not have the same range, but they exist. I don't think that we are superior on the water.

In the air? This is doubtful also. I think that here, Russia is at least even with us. Thus the only medium left in which we still may gain military superiority, if we really hurry, is space. And I am happy to learn about the recent statement our President made that he who has superiority in space will have superiority on earth. Let's put the word "military" in front of superiority and then our thinking goes, according to my opinion, in the right direction.

I personally think the now historic statement of our former President that there is no military use to space was not only the understatement of that year, it will remain the understatement of the century. The goal in space for the military man, who is more or less responsible for the survival of our nation in case political means fail, should not be the exploration of space. His main goal should be the military utilization of space. And that should be achieved in the fastest possible way. Here, we should aim at a whole arsenal of weapon systems in space.

These should start with communications and reconnaissance systems and include weather, inspection, defensive and logistic systems, and especially a bombardment system. Besides defensive and passive systems, we should have offensive weapon systems in space, manned and unmanned, with recall capability—types such as Dyna-Soar, Aerospace Plane and manned command posts in space. Most important of all, however, we need a bombardment system consisting of hundreds of nuclear bombs circling the globe in all directions. This idea is absolutely not new. I put this thought down on paper in 1948, shortly after World War II.

Many complicated and bulky space bombardment systems have been discussed since. All must wait for heavy boosters, and they concentrate the bombs in a few—and therefore vulnerable—space stations. I personally think it can be done much more simply. Besides, we have no time to wait for the heavy boosters such as Saturn or the coming heavy solids. We cannot wait until these boosters are 100% reliable. We need an effective space bombardment system now, or as soon as we can get it—a system that can be established using our present Titans and Atlases and perhaps the Titan II.

With these available boosters, we can send hundreds of nuclear bombs into orbits, and we can do it relatively inexpensively. And I even think these bombs should circle over Russia. There is no reason why we should not do that. We have our ICBM's poised against targets in Russia. The Russians have their ICBM's poised against targets in the United States. That does not mean war.

Circling these bombs over Russia can only facilitate our guidance and control problems. We don't have to change orbits in case of war and don't have to have thousands of pounds of storable propellants in each bomb, and we don't have to have complicated guidance and control systems to bring them down. I think one way to bring them down with reasonable accuracy would be to let them come down the same way the Discoverer payloads are brought down. We even can hit small targets when we increase our effort of improving the Discoverer system.

Dr. Dornberger

Dr. Walter R. Dornberger is vice president and chief scientist of Bell Aerosystems Co. division of Textron, Inc., and has been engaged in rocket work since 1930 when, as a captain of the German Army Board of Ordnance, he was assigned to the Ballistics Branch with the task of developing solid propellant rockets.

In 1936, the Peenemünde Rocket Research Center was established and with Dr. Dornberger in charge, the first prototypes of pulse-jet, solid and liquid fueled ballistic and anti-aircraft guided missiles were developed.

Dr. Dornberger came to this country in 1947 under project "Paperclip" and worked as guided missile consultant for the U. S. Air Force Air Materiel Command at Wright Patterson Air Force Base. He joined Bell in 1950 in the same capacity. Later, as technical consultant to Bell's Research Division, he advised advanced design and analysis engineers in feasibility studies of long-range, multistage ballistic missiles as well as of earth satellites.

He became technical assistant to the president of Bell in November, 1957, a year later was appointed director of engineering, and in July, 1959, was named vice president and chief scientist.

He is an associate fellow of the Institute of Aeronautical Sciences, chairman of a technical committee of the American Rocket Society and an honorary member of several rocket and astronautical societies. In November, 1959, he received the "Astronautics Award" from the American Rocket Society "in recognition of his efforts to accelerate the hypersonic glide vehicle development."

Naturally, we will have to camouflage the establishment of such a system during peacetime. We have to make it difficult for the enemy to detect and destroy such a system. For that purpose we have to let these nuclear bombs circle the globe in all directions and at different altitudes. We have to try to make it difficult for a foreign nation to track each one of them by radar or optical observation from the ground. Maybe we have to coat them with a kind of rubber or plastic coating, maybe we have to paint them dark, perhaps in different colors, or something like that, which will burn away during the reentry phase but will render radar tracking more difficult. Instead of looking for such a simple space bombardment system, we are studying all kinds of ideas, but never the easiest, most logical approach.

When I mentioned that such a space bombardment system would be relatively inexpensive, I did not mean it will be cheap. It will still cost billions, but fewer billions than a defensive system against ballistic missiles.

Historical Crossroad

I think most of us realize that we have been standing still for several years at a historical crossroad, where one road leads to a strictly defensive system, the other one to an offensive system. We cannot go both ways without endangering our national economy. We should have made the fundamental decision a long time ago.

Do we want to defend the new space frontier with a Chinese Wall, a Maginot or Siegfried Line, or do we want to stick to the well proven military concept that an offensive system—with its main purpose to deter war—is always better than any defensive system? From history we know that each and every one of the defensive systems has a weak spot. The enemy has only to find this spot and to attack there, and the whole very expensive defensive system is not worth a dime any more.

Let's assume that, nevertheless, we decide for the Maginot Line philosophy. Then there are many approaches toward action, studies and even hardware. I don't think that any one of these proposed defensive systems will give us 100% protection. We don't have to defend ourselves any more against TNT bombs, but against nuclear bombs. Even if we succeed in preventing 75% of all enemy ballistic missiles launched from reaching our country, the 25% coming through will cause havoc.

Do we really assume that a prospective enemy will launch his missile attack on our country in an all-out way by firing his missiles one at a time? No, it will be a mass attack with hundreds and maybe thousands fired at the same time. The best defensive system could not protect us against such an attack. However, if we decide for the Maginot Line approach, we have to select and establish pretty soon the defensive system against ballistic missiles which we think will give us the best protection. I personally think that a system in the form of hundreds of satellites circling the globe, in which each one is equipped with many small missiles with an infrared homing device that can be launched automatically, will be the best system. At least we may destroy part of the enemy's ballistic missiles over enemy country during ascent.

But if we decide in favor of a retaliatory system with offensive capability in space for the defense of our country, a space bombardment system to be established now, in peacetime, will be the best.

System's Advantages

What are the main advantages of such a system? First of all, an increased warning time. Presently we have 15 min. warning time. After the space bombardment system such as I described is established, the enemy has to destroy that system first before he can launch his attack against our homeland. To destroy such a system will take weeks, months, and even years. And what prevents us from putting a new hydrogen bomb in space for each one he destroys?

Secondly, we force the enemy to tremendous expenditures in order to defend himself against such a system—when we do it right. He has to find, to inspect, to make them inoperative, or he has to destroy these nuclear bombs one by one, and that is very expensive. He cannot destroy them in their orbit, because the debris may litter space between the atmosphere and the lower Van Allen belt. He has to attach retrorockets to them and has to destroy them in the upper layers of the atmosphere as they come down in an irregular flight path. And there will always be the danger of boobytraps in our space bombs.

Third, we can, after we make sure that we know what orbits these globe-circling nuclear bombs are in, initiate the retaliation in case of an all-out war without depending on ground-based signals or communication links.

Manned Command Stations

After our high-altitude nuclear tests in the South Pacific several years ago, we learned from newspapers about the interference problem with our communication system. The Russians may try such a scheme. But they cannot interfere with signals from manned command stations circling the globe in space above the bombardment system.

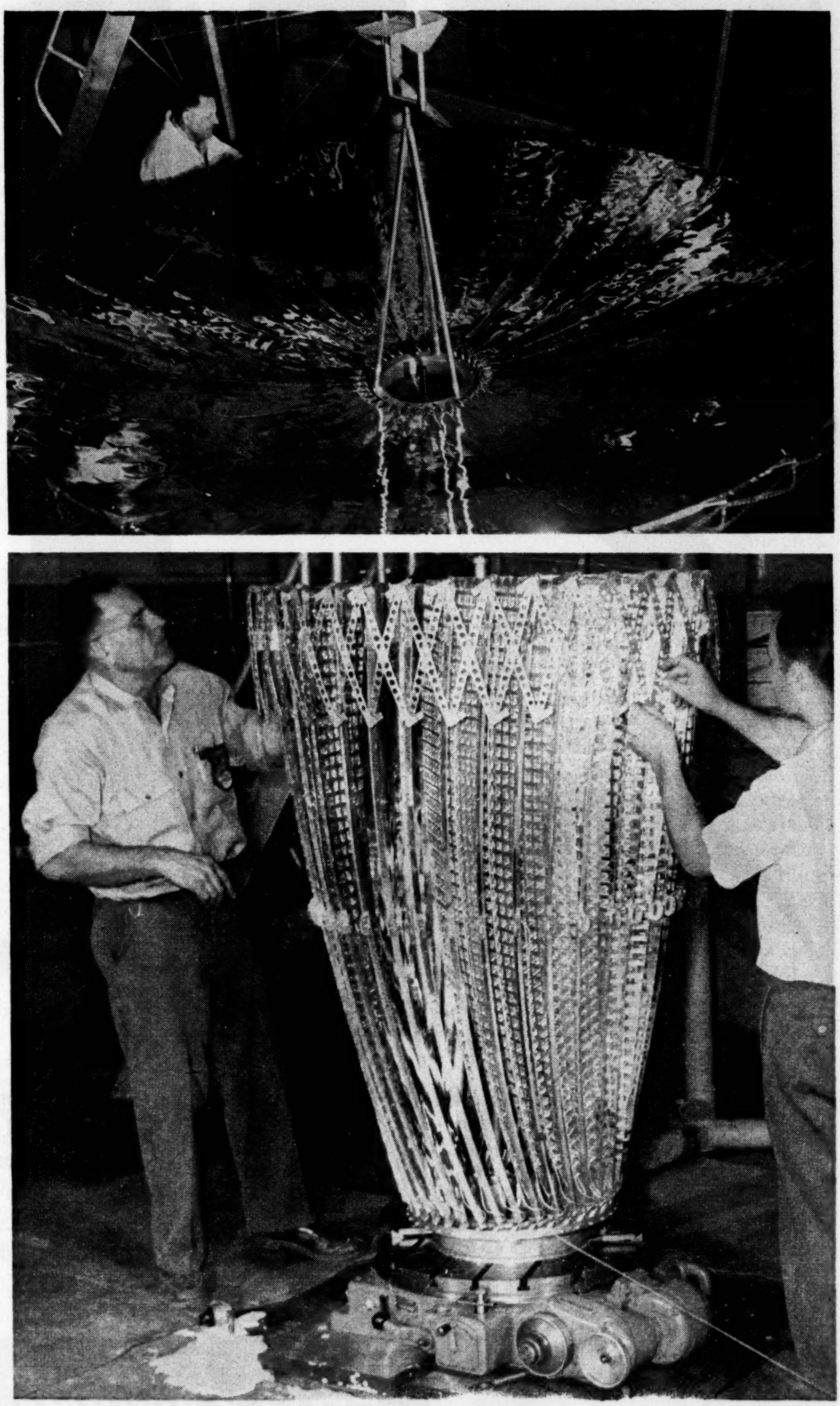
We should not, however, delay the establishment of such a space bombardment system until we get the heavy boosters needed to put the final manned command stations in space. If the prospective enemy really wants a war during the next years, he will use his hydrogen bombs for his ICBM's and not for interference with the communication link to our hydrogen bombs stored in space.

And last, but not least, with such a space bombardment system we can direct war actions away from our globe, up into space. In case we set up such a system and the Russians do likewise, I think the destruction of these nuclear bombs in space does not necessarily mean war on the ground. It will be a kind of hide-and-seek game in peacetime, costing a lot of money, leading to no political decision, but preventing war on the ground.

Establishing such a space bombardment system, putting reconnaissance and communications systems as well as logistic, inspection, and maintenance systems in space means that much more money must be spent for the military utilization of space in the next decade than, we are thinking about now. The correct ratio between the funding of our military utilization effort to the peaceful exploration effort should better be in the order of 9 to 1 for the next years.

It is my opinion that here in this field we have a last opportunity to be the first, because we can do it now with presently available boosters. And we will be the first, when we do it fast. The Russians won't do it first, because they don't have to. If there ever is an all-out war the Russians will start it with ICBM's and IRBM's fired in masses. They don't need such a space bombardment system. But we, who will never start a war, need such a system to prevent the Russians from putting their scheme into action.

There may be objections from some of



Ryan Builds Solar Collector Model

Solar collector model, built on one-quarter scale, was built by Ryan Aeronautical Co. to evaluate methods for fabricating an operational space system. The solar collector, shown unfolded, as it would be in space, at top, and in folded configuration at bottom, would be built of Ryan MiniWate, a lightweight, thin-gage material. The reflective surface would concentrate sun's rays at a boiler for powering a turbine generator.

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Air Products pioneered in research and production of cryogenic systems. Specialty: closed cycle refrigeration systems—"right-off-the-shelf" or custom-tailored to your specific requirements . . . 80°K or 2°K. Air Products offers unmatched facilities and capabilities for any low-temperature need. We invite your inquiries.

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DEFENSE & SPACE DIVISION: General Office: Allentown, Pa. DISTRICT LOCATIONS: Dayton, Ohio; Washington, D. C.; Los Angeles, Calif.; Winter Park, Florida.

our politicians, who won't like for such a system to circle over a prospective enemy country in peacetime and would rather have it circle in orbits closer to the equator, to be changed into orbits over Russia only in case of war. I personally think Russia will try to shoot down any system in space they regard as a potential threat to their country.

Soviet Air Sovereignty

At the International Law Association meeting in Hamburg, Germany, in September 1960, Soviet Prof. Vladimir Koretzki gave this answer when he was asked about Russian thinking on the upper border of air sovereignty:

"The upper border of air sovereignty is fixed by the necessity of any nation to protect its country."

That means the Russians don't recognize any limits. They don't care if such a system flies on a course over Russia or not. As long as they recognize it as a threat, they will try to shoot it down. . . .

Since the end of the last war, I have tried to get the coming military utilization of space into the minds of many leading people in this country. For many, many lost years I was not very successful, I must concede. Otherwise, our military effort in space would have gone in different directions and we would have tried harder to solve many of the fundamental problems opposing the realization of such a concept. which have not been solved up to now. Let me mention only a few:

- **Presently we need thousands** of dollars to get one pound of payload into space. This figure has to come down to hundreds of dollars per pound.
- **The next problem is reliability.** I think all our missiles and booster systems are much too complicated and therewith relatively unreliable. A big effort toward simplification should be started immediately. The money spent in this area now will bear fruits many times in the years to come.
- **We have not solved the rendezvous** problem yet, at least not in practice, and we need the answer to this problem urgently when we are talking about military weapon systems in space. Presently we cannot even put a satellite in the same orbit as the last one is in.
- **We have not solved the re-entry** problem for manned vehicles yet. Or is the Mercury approach the correct answer? Going through the tremendous deceleration forces after being in a state of weightlessness for days and weeks certainly requires a lot of human endurance. And coming down on an uncontrollable parachute after a long mission in space, ditching into the ocean, or not knowing what steep mountain slope he will hit certainly will not amuse our astronauts.

We must and we will find other ways to come back and land. Maybe the Dyna-Soar approach, with its low deceleration forces and its maneuvering capability, or some other type of maneuverable high-lift spacecraft, will be the answer. But up to now all is theory and has not been proved in practice.

- **Another unsolved problem** is the recoverable, re-usable booster. NASA can throw its expensive boosters away. NASA will launch only relatively few space vehicles. But the military will launch thousands and thousands of missiles and space vehicles even in peacetime. Do we want to throw our booster away every time?

Certainly, there are studies being done on recoverable, re-usable boosters, winged recoverable boosters, boosters with inflatable wings and so on. But where is the concentrated effort to get a practical solution as fast as possible? I know such a development is expensive, but after some 20 recoveries of a re-usable booster, we already break even with the cost of expendable boosters, and then we really save money.

- **Where is the practical answer** to the space powerplants we so urgently need in space? Where are the nuclear and electronic propulsion systems? They will come, I am sure, but we need them fast.
- **And is the development** of the auxiliary powerplant to sustain life and equipment in space really at a status where we can use them for our urgent military missions in space?

These are only a few of the unsolved problems confronting us when we look at the military utilization of space.

Let the military forget about moon shots and landing on planets. Let's spend our money more wisely in the interest of our survival as a nation, so that one day, we really will be the masters in space and achieve military superiority in the only one medium which is still open for us—space.

Florida to Increase Space Study Facilities

New York—Florida Development Commission recently issued $15-million worth of revenue certificates as the first step in a $30-million program to boost the state's space research facilities for graduate level scientific and technical training.

Florida Gov. Farris Bryant, who announced the program here, said it is designed to "back up" National Aeronautics and Space Administration's recent decision to make Cape Canaveral, Fla., the nation's prime facility for space exploration projects.

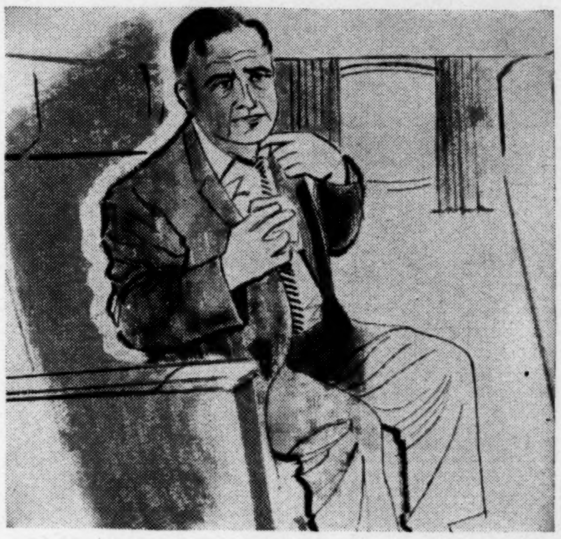
The state program will encompass increased facilities at existing state universities, development of a space study center in Palm Beach County, use of educational TV circuits by professors and students at work in various parts of the state and use of jet transports to ferry teachers and books to areas where space research is being conducted.

The state will provide $23 million of the total, Gov. Bryant said. Besides the $15 million in revenue certificates, $8 million will be provided through normal state revenue.

Another $7 million is expected to come from private resources, including foundations and direct support from aerospace industries and related companies, the governor noted.

Gov. Bryant said one individual in the state already has pledged a $2 million contribution to the program.

TOO hot or cold?



Now you can afford an automatic temperature control for your aircraft (at little more than the cost of a thermostat).

Are you getting the most out of your business aircraft investment? You are if you arrive at your destination refreshed, comfortable, and ready to tackle your business engagements. You are if your aircraft is designed for automatic comfort.

Temperature at ground level and at flying altitude can vary widely. Cross-country travel subjects your aircraft to many temperature changes. Unlike the simple wall thermostat, the Barber-Colman system provides a constant cabin temperature regardless of outside conditions. You can feel the difference. And what's more, it's completely automatic. Once a Barber-Colman system is set to your individual needs, you relax and enjoy the flight in complete environmental comfort. Check your comfort conditions next time you fly. If your collar is sticky and the air feels thick, or if there is a cool draft, then you need a Barber-Colman temperature control system to give you constant, reliable comfort.

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gives the whole story on aircraft temperature control. Write for it today and we will include a listing of sales and service centers that will install the new Barber-Colman TYL 5 kit on your aircraft. Barber-Colman temperature control systems are found in many modern buildings as well as modern jetliners. Experienced in comfort control since 1926.

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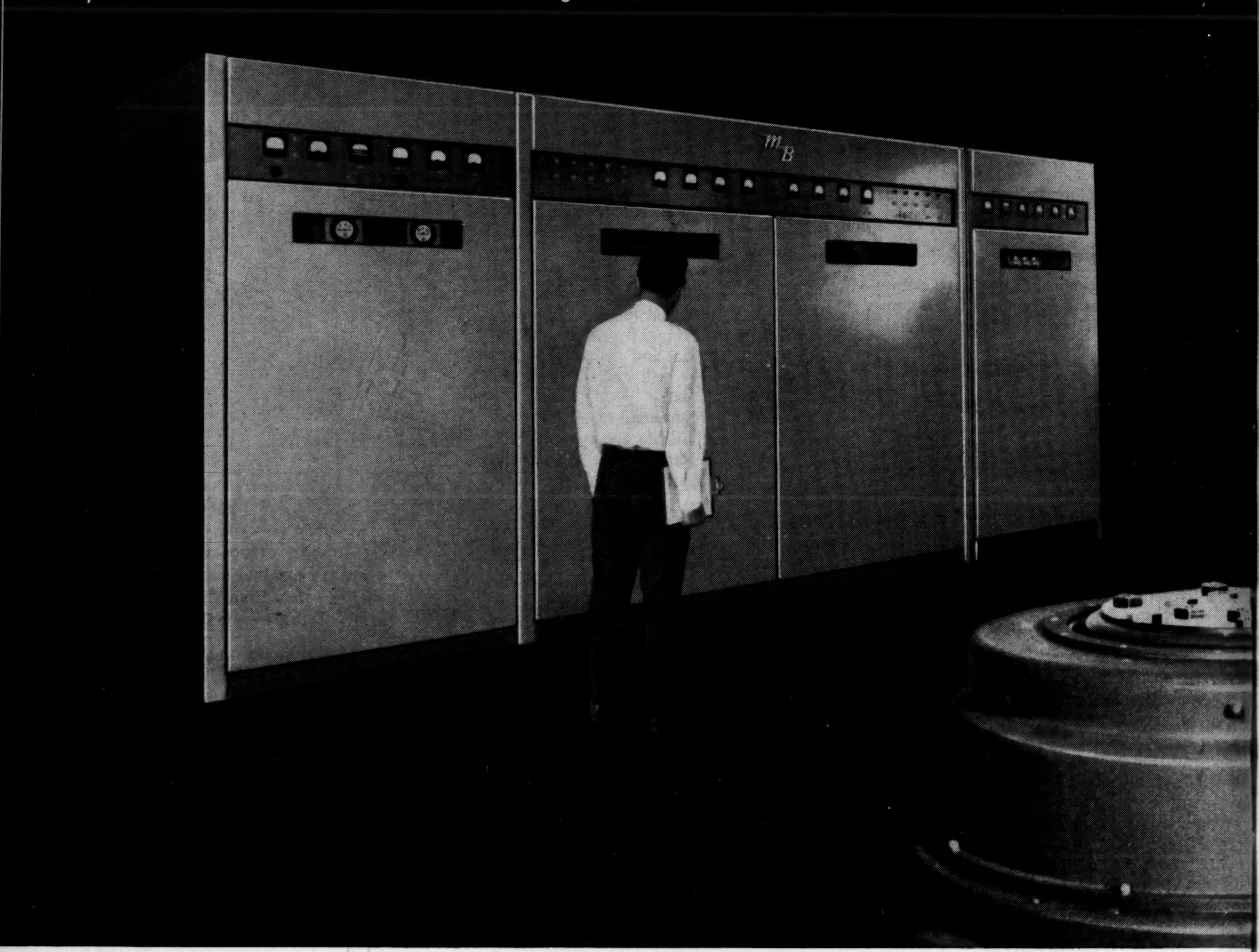
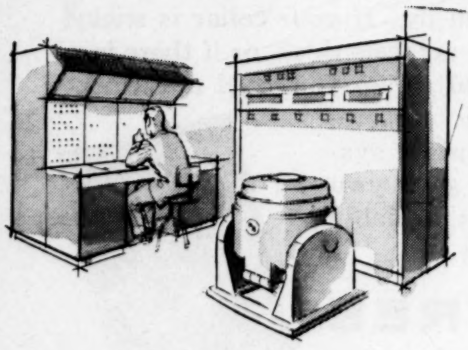
The important advances in environmental testing come from MB



New 5140MB power amplifier improves reliability in sine wave and complex motion testing



The Model 5140MB Power Amplifier is designed to drive the Model (C210) 28,000 lb. force and Model (EL 10,000) 40,000 lb. force vibration exciters. Rated at 140,000 volt amperes output with plate dissipation of 240 kw, the amplifier offers the most conservative and reliable operation in the vibration testing field. It will readily handle all the adverse inductive and capacitive loading of the electrodynamic exciter.

These outstanding features are responsible for the greater reliability of the Model 5140MB amplifier:

1. 15 db negative feedback provides lowest source impedance and lowest distortion into the shaker load.
2. Oversized driver tubes for high random peaks.
3. Oversized amplifier with oversized output tubes.
4. Plate dissipation capabilities exceed vibration exciter requirements by a minimum of 33⅓%.
5. Compact water systems feature "water-miser" regulation of secondary water and a demineralizer insures low conductivity in primary coolant.

For additional information on the new 5140MB Power Amplifier, write for Bulletin 134.

A pioneer and leader in the field of electrodynamic vibration systems, MB continually strives to improve the performance and reliability of vibration, shock and fatigue testing. The important advances in environmental testing come from MB.

MB Electronics has representatives in principal cities throughout the world.

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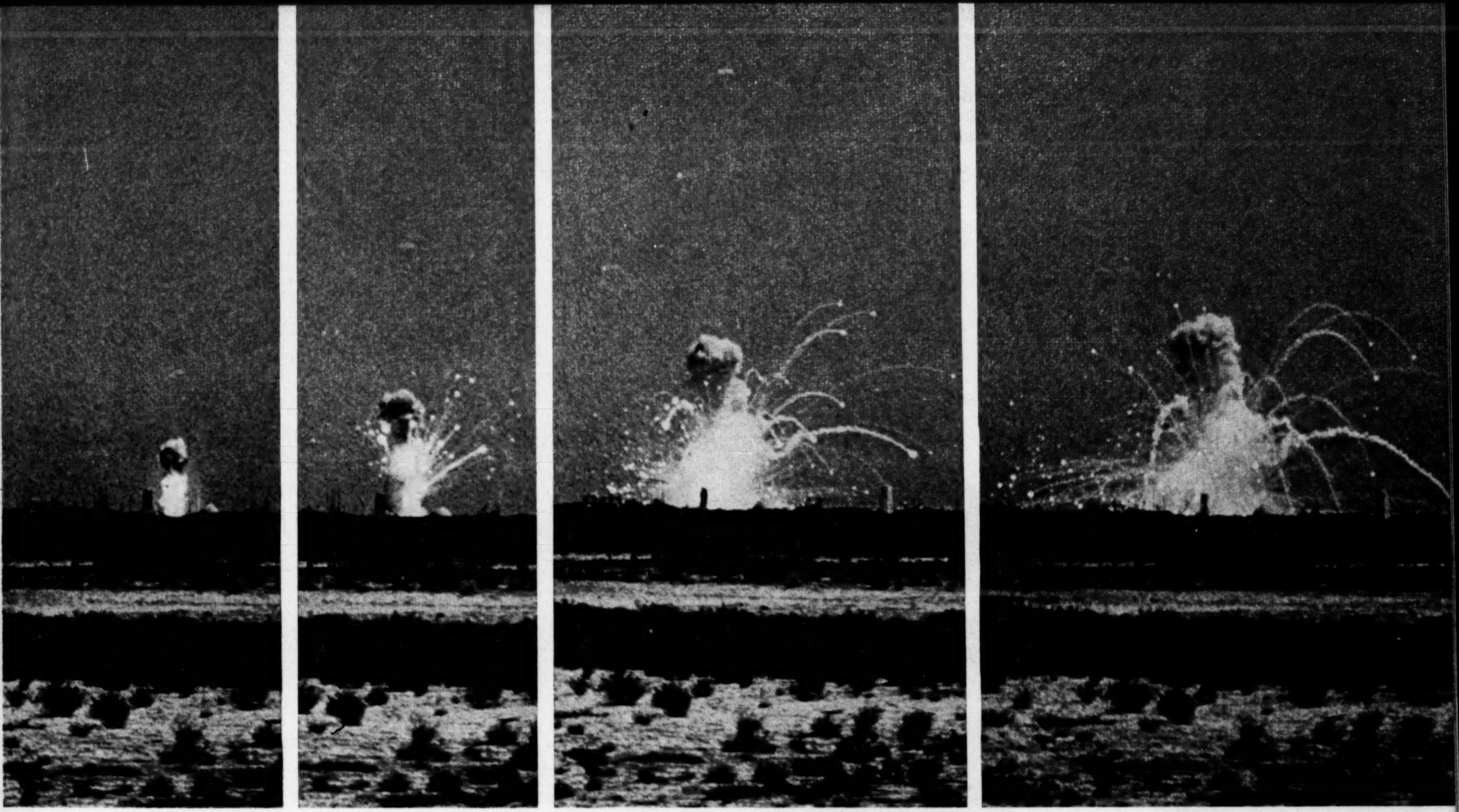
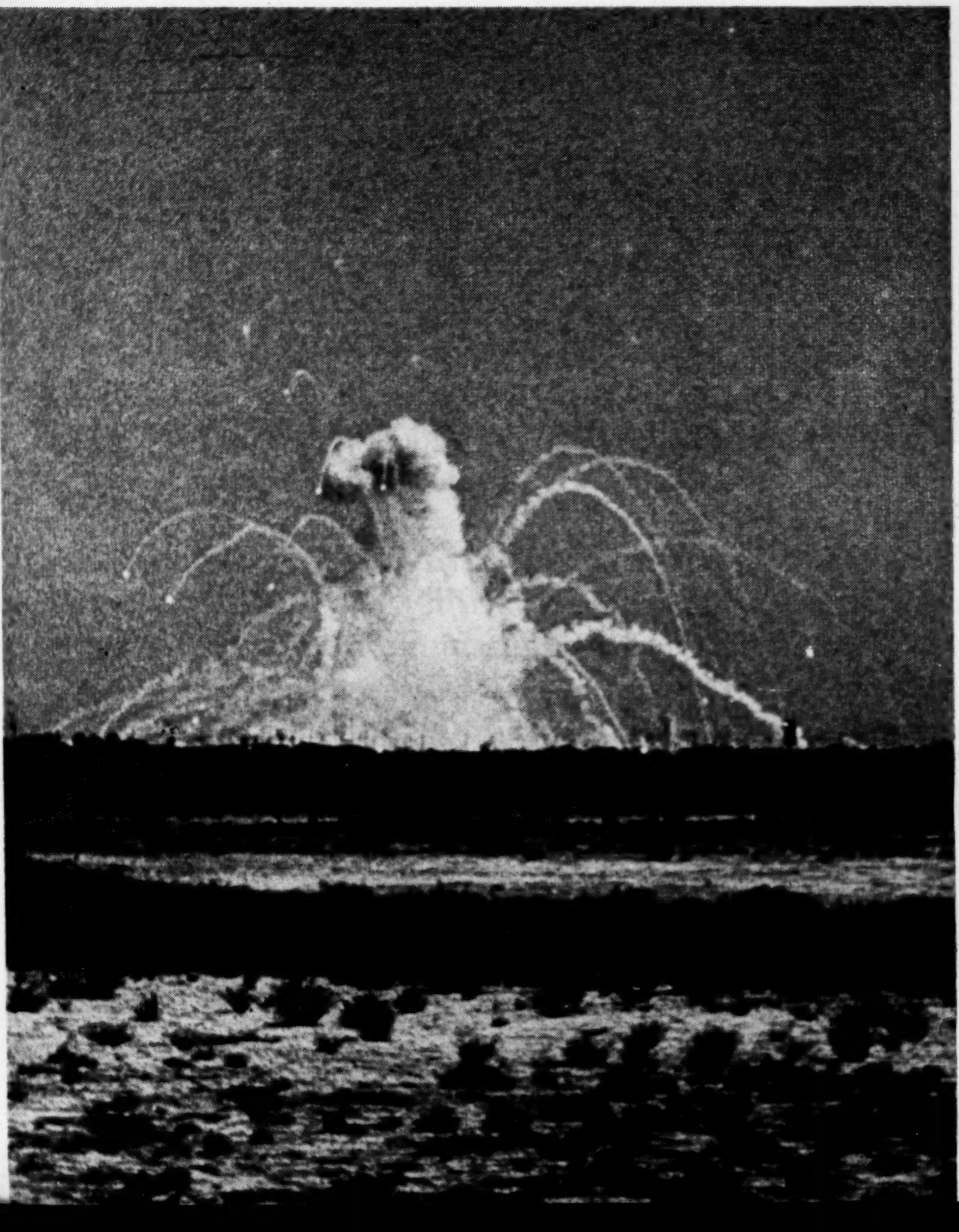
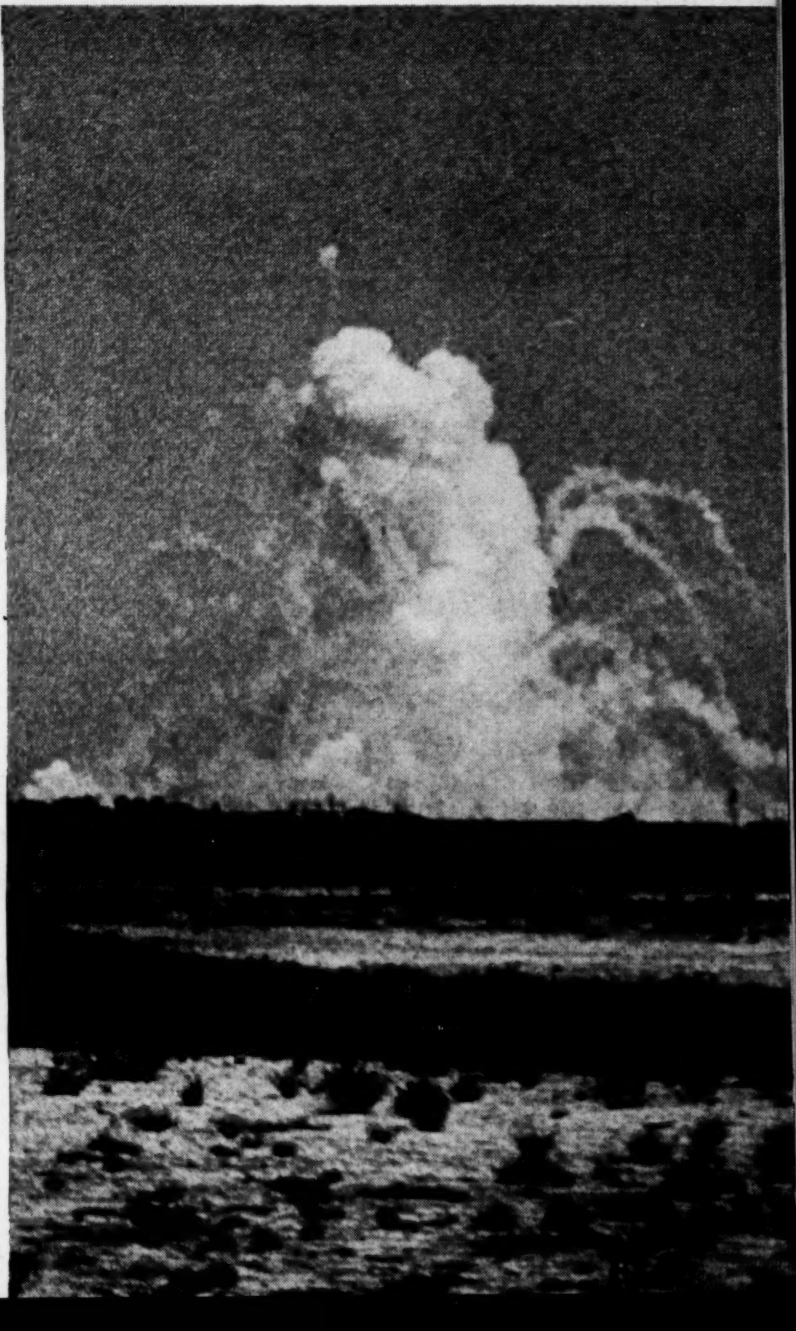
A DIVISION OF TEXTRON ELECTRONICS, INC., 1078 State Street, New Haven 11, Conn.



First Attempt to Launch Minuteman From Silo Fails

First attempt to launch a USAF-Boeing Minuteman solid propellant missile from a silo on an untethered flight over the Atlantic Missile Range failed Aug. 30 when the second stage ignited prematurely just after the missile cleared the top of the silo and the range safety officer had to destroy it (AW Sept. 4, p. 26). Service tower silhouetted against the flame in the third picture from left, above, is 80 ft. tall.





right to left:
George Otis II, *Astro-Science Chairman*
Peter H. Stanton, *Astro-Science President*
Alan F. Thompson, *American Astro-Systems President*

A CORPORATION ON THE GO

American Astro-Systems, Inc.* joins the fast-growing Astro-Science Corporation family, increasing sales by $8 million and facilities by another 180,000 sq. ft. The new division adds to Astro-Science a unique capability in military mobile ground support equipment, having successfully delivered over $50 million in high-pressure refrigeration, mechanical positioning, electronic and electrical power equipment.

Other Astro-Science Divisions: American Concertone, Inc.—pioneer producer of magnetic tape recorders for the military, industry and home./American Avionics Inc.—manufacturer of military electronic equipment.

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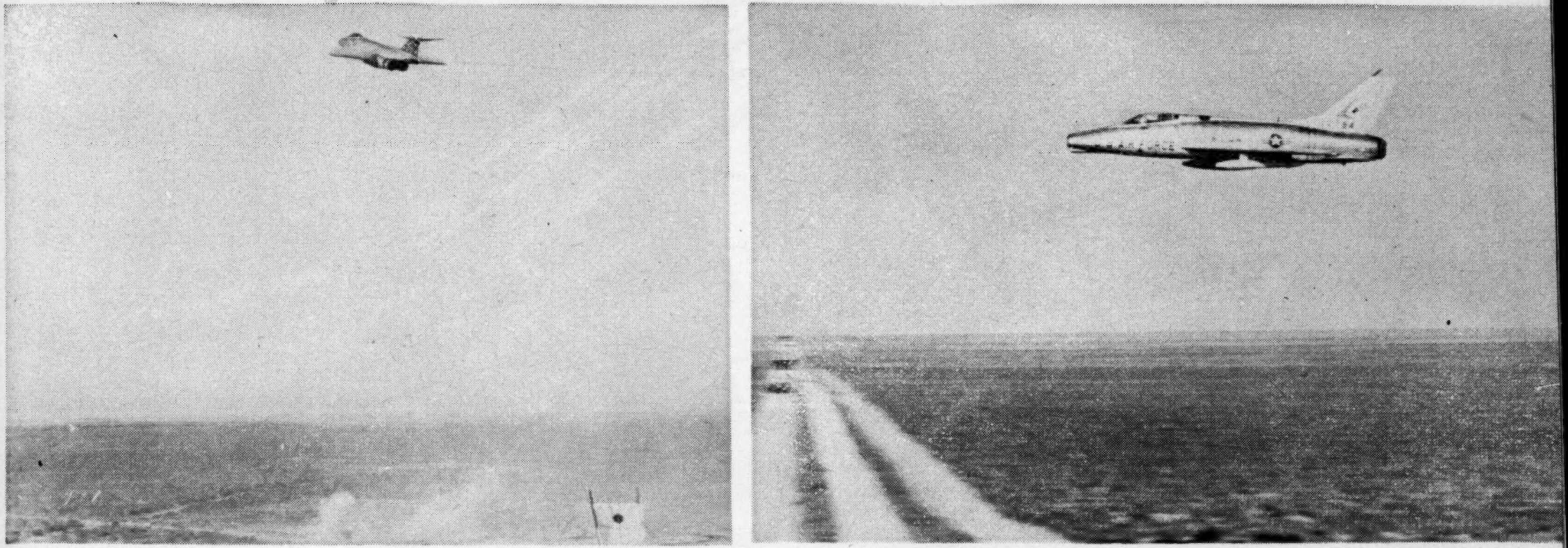


McDONNELL F-101 pulls up (left) after low-altitude firing run over Wheelus' El Uotia gunnery-bombing range, the Libyan weapons training center for most U. S. Air Force aircraft that are based in Europe. North American F-100 (right) is shown 50 ft. above the desert sage of El Uotia, beginning a low-altitude special weapons run over the African range.

USAF Conducts Tactical Training in Libya

By Cecil Brownlow

Wheelus Air Base, Libya—Delivery of non-nuclear weapon systems and a sharpening of close-support gunnery techniques are assuming new importance for European-based tactical fighter units as they gear to meet the widening East-West crisis now focused on Berlin.

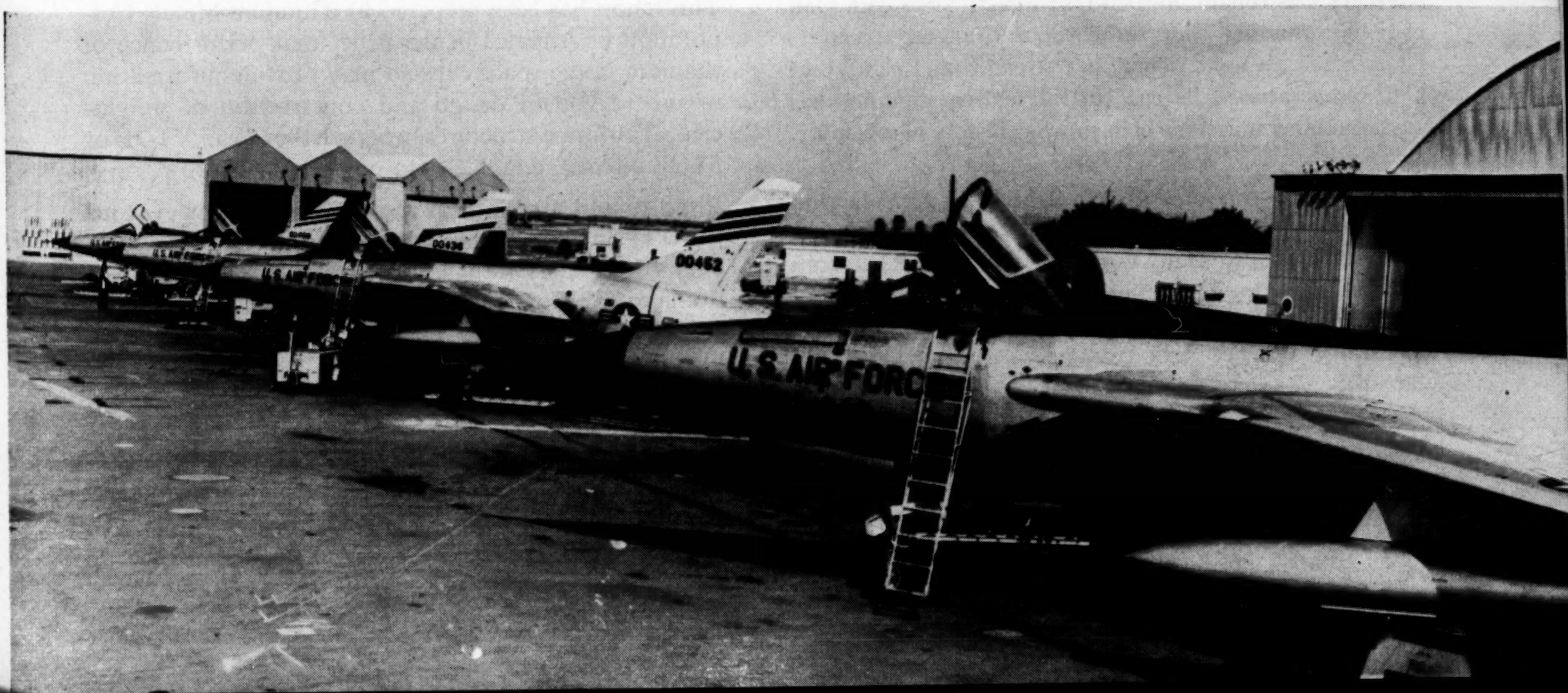
Following President Kennedy's recent emphasis upon the necessity for the armed forces to expand their conventional warfare capability, tactical pilots and aircraft of the U. S. Air Forces in Europe—many of whom have concentrated almost exclusively upon nuclear delivery maneuvers over the past few years in line with former national policy—now find themselves strafing gunnery targets from low altitude, rolling into dive-bomb runs and cutting over the terrain in skip-bomb approaches.

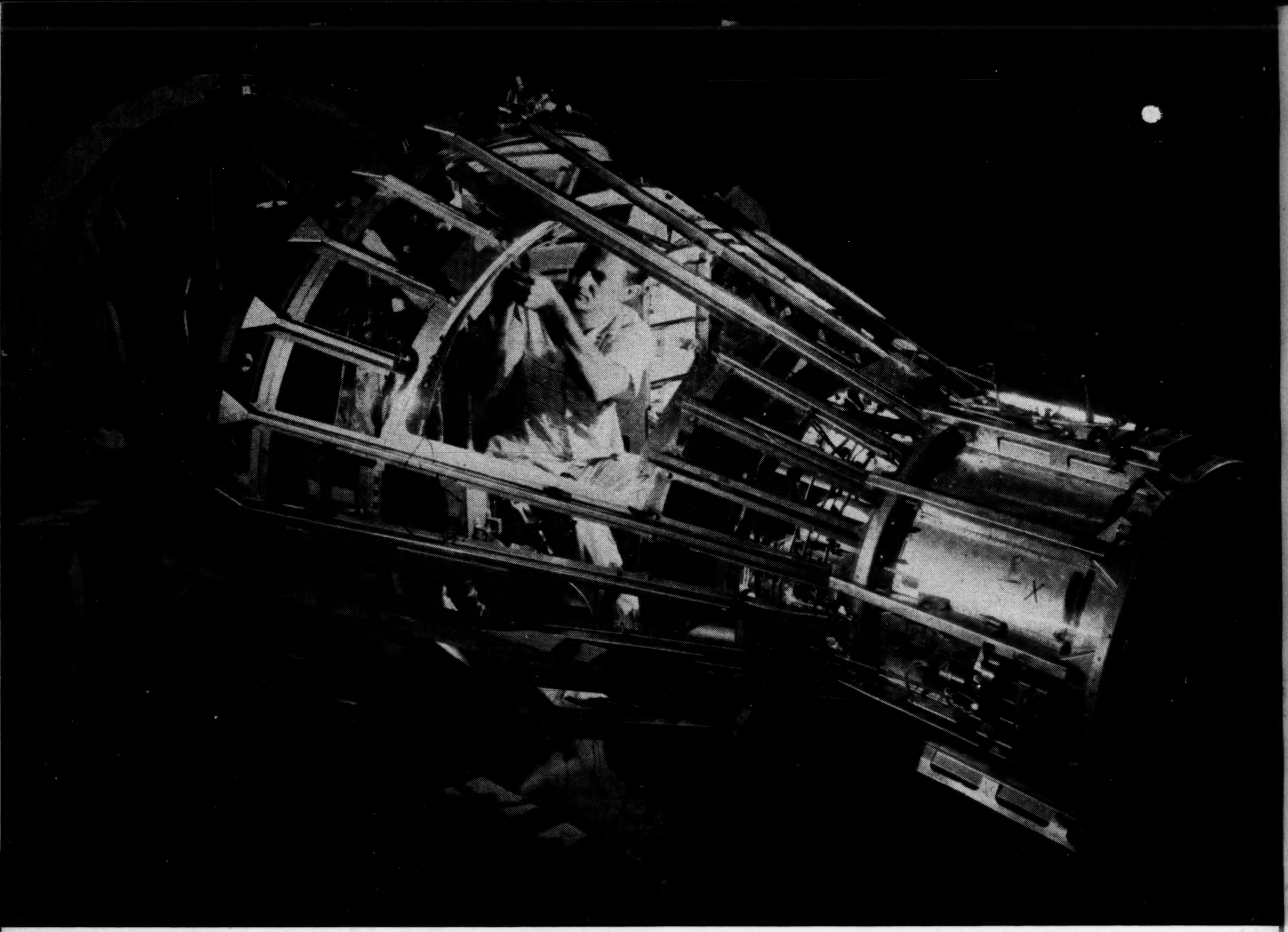
This accelerated pace, coinciding with the appearance of new aircraft, weapons and general operational techniques, is placing added strain upon the planning and day-to-day requirements of the USAFE Weapons Center here, training ground for most Air Force tactical bomber and interceptor units that are stationed in the European theater.

New aircraft on the scene is the Mach 2-plus Republic F-105D all-weather fighter bomber designed primarily as a nuclear weapons carrier but with a conventional capability with which its pilots are scheduled to become well schooled. New weapons with which the center must soon contend include the Martin GAM-83 Bullpup air-to-ground missile.

Both will require new procedures and plans for the center's El Uotia gunnery and bombing range, a swatch of white plaster buildings, olive drab tents and

REPUBLIC Mach-2-plus F-105s of the 36th Tactical Fighter Wing, newest addition to the Air Force's tactical fighter strength in Europe, line the ramp at Wheelus Air Base, Libya, where their pilots are gaining proficiency in weapons delivery and gunnery techniques.





Mercury capsule's all-titanium frame of hat-section stringers and machined rings.

45,000 inches of welding

Titanium construction clinches record of reliability with Mercury capsule!

Mercury's astronaut, and all that was at stake with him, rode out the big shot safely in a titanium structure. Chosen for its light weight, its strength and rigidity at high temperatures, its ease of fabrication, titanium has passed another milestone in its growing history of reliability.

Project Mercury's pressurized capsule, its antenna and parachute housings and the adapter section mating it to the booster are basically titanium structures. They consist of a titanium inner skin attached to a framework of titanium stringers and rings. Beryllium and Rene 41 heat shielding "shingles" are fastened to the outside of the capsule.

The use of titanium has saved "considerable" weight over other metals of similar strength and endurance in the all-critical weight battle in the Mercury capsule and adapter section where ounces were fought for.

This report has been prepared by Titanium Metals Corporation of America in the belief that performance of titanium in the space capsule may provide information of use to you in design and construction of weight-critical airframe structures, whether they be in VTOL or STOL aircraft, or vehicles to operate in space.

Rigidity and strength at high temperatures . . . and 20 G's! Shaving off pounds was not enough for Mercury's designers. One of the big factors in the selection of titanium, which is as strong as most steels, yet weighs 44% less, is its ability to retain its strength and rigidity at high temperatures.

During the launch phase, the all-titanium adapter section reaches 600F. The titanium stringers in the capsule reach 600F during re-entry; the inner skin reaches 200F. Here titanium construction proves its high performance and reliability. Mercury capsule is designed to withstand 20 G's.

Titanium construction inherently rigid. Titanium lends itself to an actually stiffer construction even though its modulus is somewhat lower than steel's. The answer is a greater cross-section made possible by the less dense titanium. Moreover the metal will retain its stiffness over a wide range of temperatures.

Added stiffness and efficiency can be gained by "rigidizing" or beading. Mercury inner skin, which is also the cabin inner wall, consists of two layers of 0.010" commercially pure titanium, welded together to form a single "sandwich" structure. The inner layer is flat-rolled. The outer layer has been stiffened with corrugations approximately 3 inches in length and ½-inch wide. The result is a 0.020" titanium section that is equal in rigidity to an 0.050" section . . . 150% increase in efficiency.

45,000 inches of reliable welds per capsule. Project Mercury capsule, in addition to its high G loadings and temperature requirements, is pressurized to maintain its cargo of human life. Welds *must* be reliable.

According to McDonnell Aircraft, St. Louis, Mo., developers and manufacturers of the capsule, there are 24,500 inches of seam and butt weld and 20,500 inches of spot weld in each capsule . . . 45,000 inches of welding. The performance has been repeated in 20 production capsules.

Here indeed is a better focus on the reality of titanium welding!

All fusion and seam and spot welding was done "open air." Fusion welds were inert-gas shielded, tungsten-arc, using trailing and backup shields. Welds are as strong or stronger than parent metal, McDonnell reports.

Spot and seam welding was accomplished on standard production equipment, with techniques similar to those used on the stainless steels.

TMCA: your information source. If your missile or aircraft problems revolve around requirements for a rigid, high strength structure at temperatures from *minus* 433 to plus 1000F . . . with high corrosion resistance, including immunity to atmospheric attack, titanium may easily be your best answer. The reliability on which the makers of the Mercury capsule placed their faith can work for you.

We suggest you get in touch with the nearest Titanium Metals Corporation of America sales office or write directly to our Technical Service Department for information on titanium application . . . fabrication . . . competent fabricators. Why not write today . . .

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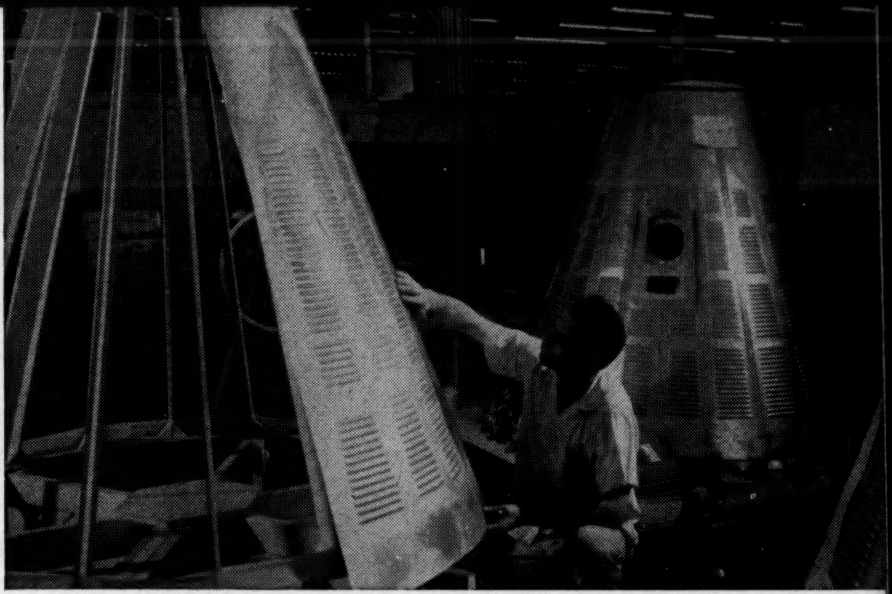
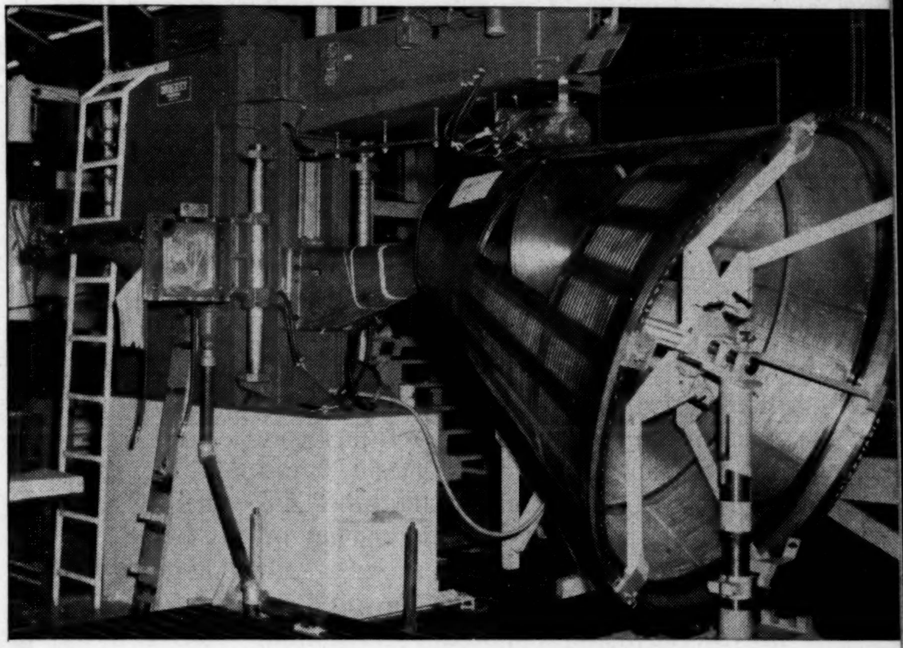
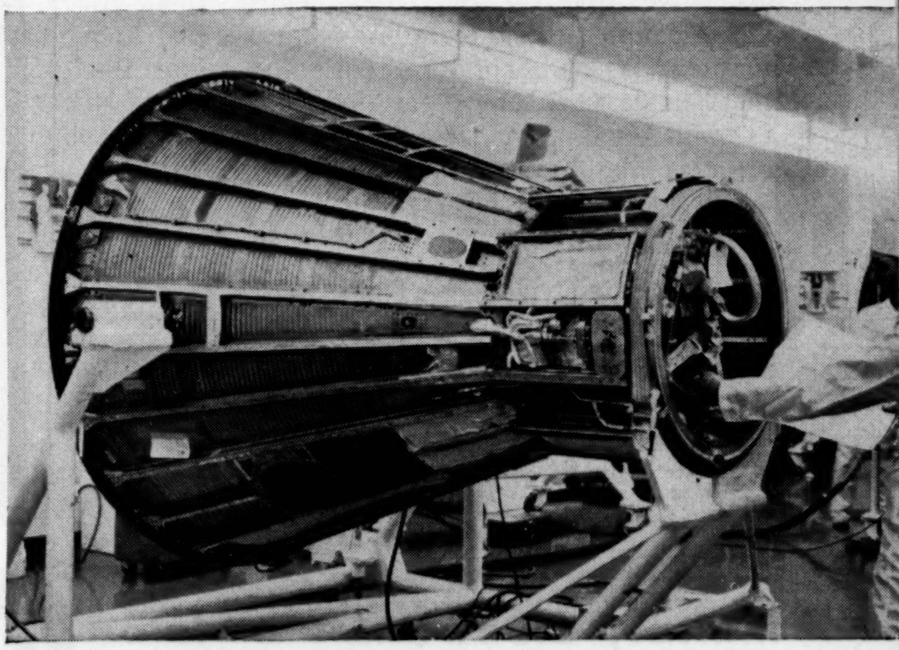


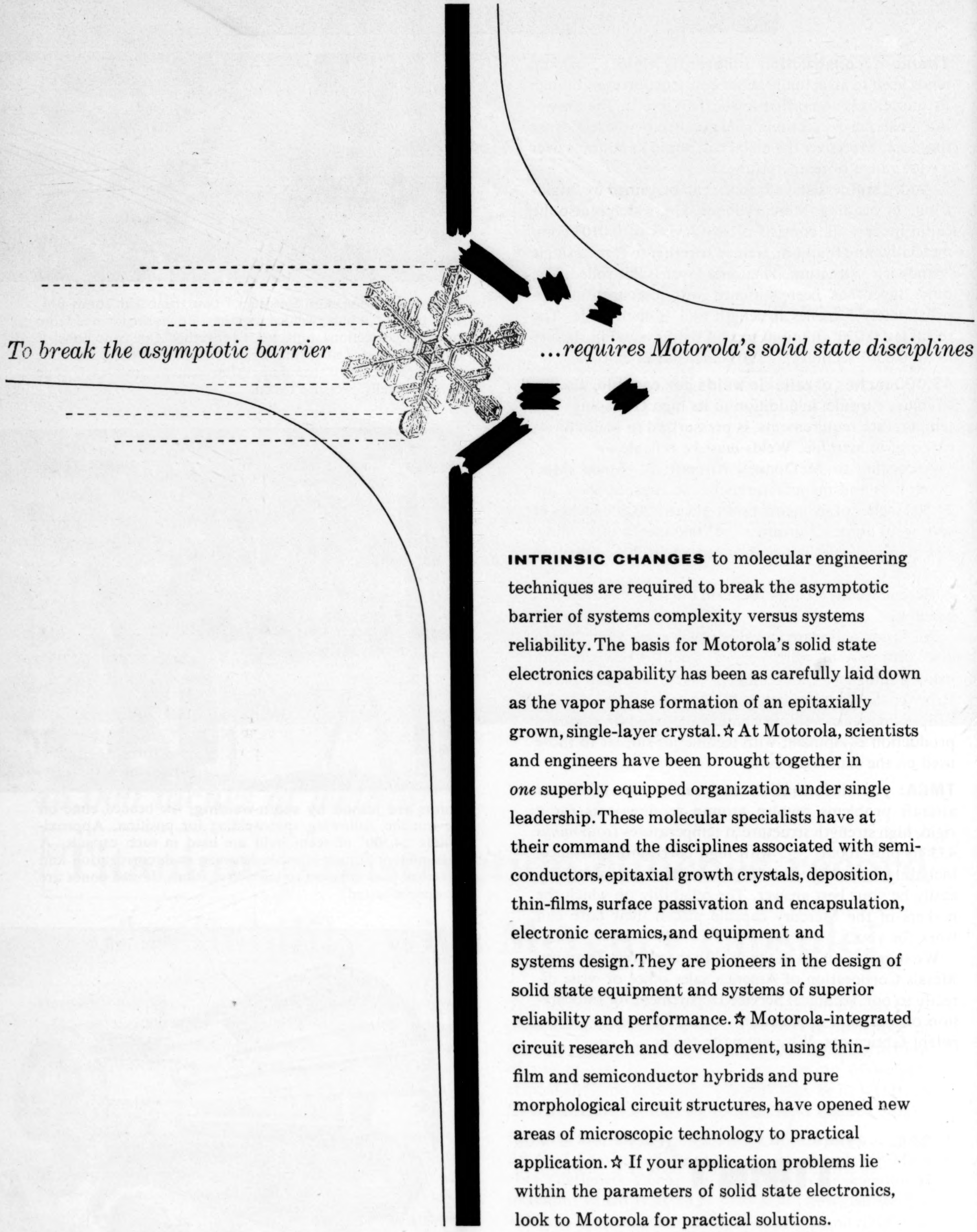
Titanium inner skin consists of two truncated cones 6½' high by 6½' at base, welded together. Cones are formed from trapezoidal sections, butt-welded together. One cone consists of 0.010" beaded titanium, for added stiffness; the other cone of flat-rolled 0.010" titanium. After butt-welding, each cone is individually pressure tested.



Cones are joined by seam-welding, the beaded cone on the outside, following spot-welding for position. Approximately 24,500" of seam weld are used in each capsule. A circumferential pass is made between each corrugation and a vertical pass adjacent to the corrugations. Joined cones are also proof-tested.



Basic titanium capsule structure consists of welded, two-layered cones which are spot welded to the titanium frame. The housing and adapter sections are not pressurized and consequently the skins are riveted to the frame in these areas.



To break the asymptotic barrier ...requires Motorola's solid state disciplines

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U.S. AIR FORCE
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DESERT CAMEL and handler greet the first F-105s to reach Wheelus after a flight from their home base in Bitburg, Germany.

target areas 75 mi. southwest of here in the scrub plains of the Libyan Desert, and even some older weapons now being refurbished are providing their share of headaches.

With the Kennedy order, the aging 2.95-in. rocket systems are returning to prominence, and the Weapons Center has been told to phase them into its program on a rapid-fire basis. Using these as an example of the increasing tempo, one leading Weapons Center officer complains mildly that "we don't know how many a pilot should fire or what's considered proficient, but here the order is for us to use them."

Range schedules obviously will have to be revised when the F-105s begin to make necessarily time-consuming blind approaches with the pilot dependent upon radar for navigation and weapons release and when aircraft start their low approaches from over the Mediterranean for Bullpup firings rather than slipping immediately onto the range from the staging area as can be done now.

"Obviously," a range spokesman says, "you can't have one plane doing a LABS (low-altitude bombing system) or making a blind approach while another one comes in underneath for a dive-bomb run."

First Step

For all the new emphasis on conventional systems, however, USAFE and Wheelus planners have no intention of letting the fighter-bombers' nuclear delivery capabilities slide. Advance techniques offering greater simplicity and more accuracy than the intricate LABS maneuver are being practiced daily, and the F-105 pilots will become proficient in this phase as a first step, relying upon subsequent visits to Wheelus to brush up on their conventional tactics.

The F-105 began phasing into Wheelus on July 16—actual practice flights over the range got under way two days later—upon the arrival of the first aircraft from the 36th Tactical Fighter Wing homebased at Bitburg, Germany, about 300 mi. from East Germany and advance elements of the Communist air forces.

The 36th, initial European-based wing to receive the F-105, now has approximately 25 aircraft on hand. Some of its pilots still are completing the transition course from the older North American F-100 at Nellis AFB, N. M., and 12 of these are at Wheelus on a rotational basis.

First group to pass through was the 36th's 22nd Squadron, which has been averaging about 18 sorties a day, with some of the aircraft making up to four flights during the 8-hr. period the range is in operation. Length of a single mission totals about 1 hr. 20 min., of which 20 min. is actually spent over the range. The remainder of this time is consumed in flying to and from the range, flying holding patterns before the initial runs and, later, rendezvousing for the return flight.

With spares for the electronic systems a critical factor, the number of aircraft available on any given day has been fluctuating between 6 and 10. "Parts," a 22nd operations officer says, "have been killing us. We just don't have everything we need to keep those black boxes going.

"The big problems right now are maintenance and supply and getting used to the new equipment. . . . We're coming up with a lot of little problems . . . but we're solving them."

Two of the problems have been more than routine and cause most of the relatively little criticism, voiced by pilots, of the F-105 as a system.

In one, a 22nd aircraft on autopilot began to pitch violently, exceeding all g-force limits and tearing off in the process the wing tanks which then proceeded to slam into the leading edge of either wing before falling away. The violent motion was brought under control manually after the autopilot had been disengaged.

Autopilot System

Although the General Electric technical representative dissented, the Air Force placed tentative blame on the GE autopilot system, which can be used for navigation plus automatic release of the weapons store while flying the aircraft in an over-the-shoulder delivery maneuver. Apparent problem lay within the coupler between the autopilot as such and the auto toss unit—an over-riding of gears that deflected the stabilizers by 4½ deg. rather than the programed 1 deg.

Use of the unit was restricted for three weeks at Wheelus while the coupler and servo systems were checked. Some fixes were made on the spot, and the 22nd has begun using them again. During initial training here, however, where the emphasis is on pilot skill, the auto toss phase of the system will not be employed. Permanent fixes for the coupler unit are under study.

Another problem—one instance was experienced at Bitburg, another at Wheelus—has been a failure in the air turbine motor which resulted in the overheating of the communications system and subsequent loss of radio contact with the ground during approach.

A spokesman for Republic Aviation Corp. says this deficiency has now been corrected.

Such problems aside, most pilots term the F-105 a "very fine" airplane in its over-all aspects and flyability. For the initial phase of training here, concen-

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trating upon a specific special weapons delivery technique plus some conventional air-to-ground strafing with the aircraft's high-speed Vulcan 20 mm. cannon, pilots have needed slightly more than eight missions each on an average to become qualified.

Concentrating during this visit upon nuclear weapon techniques as a primary goal in order to provide some measure of combat capability at the earliest possible moment, particularly over the present period of international crisis, the F-105 pilots will return here on a rotational basis at a frequency of about once every two months to round out their syllabus and become fully qualified. Subsequent phases, requiring a pilot to remain at Wheelus for between two and two-and-one-half weeks at a time, will be devoted to conventional deliveries plus varied types of nuclear attack.

At Bitburg, where weather and a populous terrain preclude little more, the pilots are concentrating upon such areas as navigation, instrument flying and working with forward area controllers who would help guide them to their war-time targets. In its Wheelus training, the 36th also attempts to shuttle all of its aircraft to Libya for a check of their bomb release systems in actual operation and to qualify them as combat ready along with their pilots.

Temporary Deficiency

One temporary operational deficiency has been the restriction against use of wing tanks since the two broke away from the 22nd F-105 during the pitching maneuver while on automatic flight. Removal of the tanks has cut the aircraft's loiter time considerably and means that, if they are to make full use of their alloted 20 min. over the range, they must be brought in on the dot from their holding area. The tanks, however, will be re-installed upon completion of studies on the causes of the incident and the stresses that made them break away.

The range itself is now being equipped with reflector targets to permit the F-105s to fully simulate blind radar approaches and drops, and plans for integration of the aircraft into the Wheelus operation began well over two years ago, although a special area for the plane, including buildings suitable for maintaining its sensitive electronic systems, is still in the construction stage.

Advanced planning and provisioning for the aircraft included determination of range requirements, the amount of airspace needed for practice runs, types and quantities of spares that should be stocked plus "a multitude of support requirements," according to Maj. Daniel J. Sheehan, Jr., chief of the tactical operations branch in Lt. Col. Walter A. Rosenfield's Weapons Training Division.

Sheehan and others also had to consider means of phasing in the F-105 without disrupting the activities of the older tactical aircraft that have been training here for the past several years—the F-100 and the McDonnell F-101. At the moment, increments of six European-based tactical units are at Wheelus. Aside from the 36th with its F-105s, they are:

- **48th Tactical Fighter Wing** from Lakenheath, England, with F-100s.
- **20th Tactical Fighter Wing**; Wethersfield, England; F-100s.
- **49th Tactical Fighter Wing**; Spangdahlem Air Base, Germany; F-100s.
- **50th Tactical Fighter Wing**; Hahn Air Base, Germany; F-100s.
- **81st Tactical Fighter Wing**; Bentwaters, England; F-101s.

The 49th is the next European wing scheduled to receive the F-105 and, by January, when these begin phasing into the operation here to add their weight to those from the 36th, a total of 24 normally will be at Wheelus at any given time.

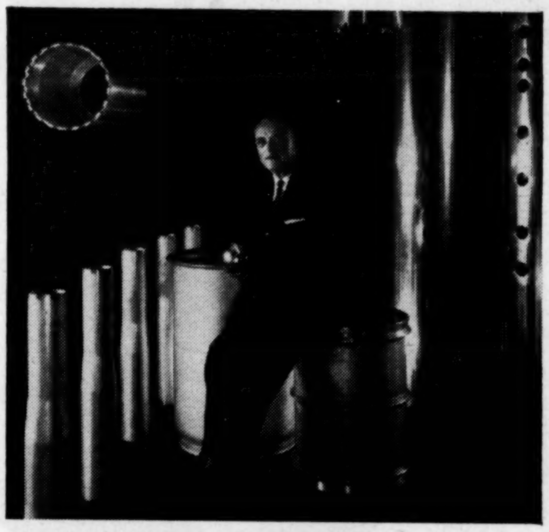
In addition to the tactical units, Convair F-102 interceptors also are training at Wheelus, firing Hughes GAR-1 guided air-to-air missiles at airborne targets from an aerial range over the ocean designated Danger Area 2, while fighter tactics are practiced over a similar area known as Danger Area 1. The GAR-1 will soon be joined by the GAR-8, USAF version of the Navy's Sidewinder infrared-guided air-to-air missile.

F-102s now at Wheelus are from the 86th Air Division stationed at Ramstein Air Base in Germany with six aircraft on Station as opposed to the 12 normally sent to Wheelus by a tactical unit at any one time.

To accommodate the numbers of tactical aircraft on hand with maximum effect, the El Uotia desert range is divided into two parallel target areas, with a narrow strip extending from the vulnerable control tower dividing the two. Col. James S. Coward, Wheelus deputy commander for operations, terms the range and its twin facilities as "probably the busiest in all the world," and Maj. Sheehan adds that, to his knowledge, "it is the only dual special weapons range in USAF."

As an example of its activity, an average of 63,555 practice bombs are dumped upon the range during 19,835 air-to-ground sorties flown from Wheelus during a year's time. Interceptors fly an additional 1,536 sorties over the two water ranges over a normal year.

The range can handle a maximum of seven aircraft during a 20-min. practice period, with each making three special weapons and four conventional runs over one of the two target areas. On the basis of 24 20-min. periods, Maj. Sheehan estimates that an average



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The small aluminum globe in the picture is a bomblet Alcoa engineered and developed for the U. S. Army Chemical Corps. The tall tubes to the right are Zuni missile outer shells. The pieces that resemble chess rooks are center sections of the Air Force's Bullpup missile. The drums are chemical shipping and storage containers for the armed forces. The cylinders on the left are ammunition rack tubes for Army Ordnance's M-60 tank.

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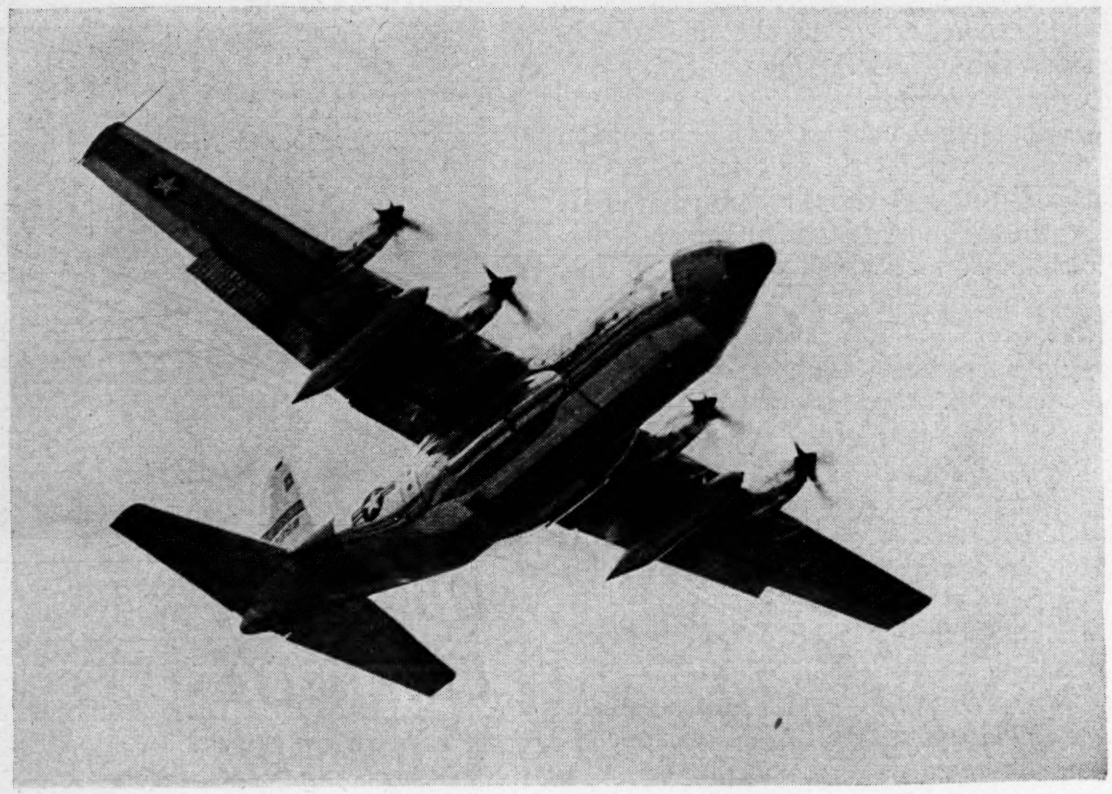


C130E Has External Wing Tanks for Extended Range

USAF-Lockheed C-130E Hercules transport has a fuel capacity of 9,680 gal. with the addition of underwing tanks and can carry 17 tons of cargo across the Atlantic. The first C-130A is expected to enter operational service with Military Air Transport Service next March. First flight of the aircraft was last month.

of 485 practice bombs are released onto the range every working day.

Sheehan's office has a liaison officer for each tactical and interceptor wing on base, a veteran pilot who flies with the unit, monitors its progress, recommends possible changes in weapon system delivery techniques and generally assists in the over-all training program.

Liaison officer for the 36th is Capt. Alonzo L. Ferguson, a former F-100 instructor pilot, who must be able to cope with a wide spectrum of activities, ranging in scope from briefings on rules and regulations of the officers' club to assistance in instrumenting the range to handle F-105 radar approach runs.

Wheelus itself is a vital link in the continued preparedness of USAF units in Europe and could well become an increasing target in the cold war squeeze. "All these units," Col. Coward says, "are pretty dependent upon us for maintaining their proficiency." There is neither space nor weather for the task in Europe, and the time lost in returning to the U. S. for such missions would be prohibitive.

The question is, how long will Wheelus be allowed to remain?

With USAF already pulling out of its other North African sites, Wheelus will soon become the lone Air Force base on this continent, and the consensus here seems to be that "the pressures to close us will increase."

Present Base Rights Agreement with the Libyan government was signed in 1954, two years after the country became an independent nation, and, with luck, will continue in force until December, 1970. A financial annex to the agreement was renegotiated in 1960, with the U. S. agreeing to pay the Libyan government $2 million a year in straight rental fees. The annex will be renegotiated again in 1964, "and I suppose the chances are very good that the price may go up again," says one top Air Force officer here.

The agreement per se, however, is regarded as an "excellent" one by Col. Stebbins W. Griffith, commander of Wheelus and its support 7272nd Air Base Wing. "It would be hard to negotiate one like it anywhere else in the world today," Griffith says. "It gives us quite a bit of freedom. . . . I don't, for instance, have to answer to any Libyan official as to what we do here just so long as we aren't violating Libyan law."

Libyan Rule

Griffith believes the problem of Wheelus' continued existence will be a relatively minor one so long as King Idris I, the present, and absolute, ruler remains in power. Idris, who Griffith says is a staunch friend of the West, is 71, however, and childless. His designated successor is a 33-year-old nephew.

Col. Griffith believes the nephew also may be a friend, others are not so sure, and there is the added question of whether he can exercise control over the divided political factions after Idris, the strongman, has passed away. Refugee political leaders in Cairo already are calling for Wheelus' demise.

Along with rental fees and the friendship of Idris, U. S. Mutual Aid funds and assistance teams help bind Libya to the West, but the problems are great. Nationalists resent the very idea of a foreign base and, despite continuous community relations efforts, the noise of jet aircraft is a constant irritant to the neighboring Arabs and to their camel and goat herds.

The desert range encompasses a small section of a traditional camel trail, and the herders see no reason why their paths should be diverted despite the obvious dangers involved and all the warnings thereof.

Libya's geographical location is a handicapping factor in itself, bordering as it does onto both Tunisia and Algeria, two countries engaged in bitter struggles with France, and the Libyan port of Tripoli near here often is used as a headquarters by the Algerian rebels.

The occasional crash can provoke a major incident. "If a plane hits a house, it's no use trying to explain that it wasn't done deliberately, and anyone appearing on the scene in a flying suit is taking his life into his hands," one officer here says.

And, there's little doubt that the Libyans could make existence at Wheelus untenable within a relatively short time if they really wanted to do so, since its supply lines extend well beyond the gates and into open, unprotected country.

Water, as one example, is supplied to the base from wells which, "almost without exception," are located off base, with the easily detectable pipes running above ground. The on-base supply is limited, and the Libyans "know they could put us out of operation very quickly," according to Col. Coward. Regular motor fuel and the diesel oil used to run vital base operations such as electrical generators also are supplied from the outside, normally by truck, although emergency land lines are available.

The supply line for jet fuel and aviation gas, however, is more secure. Here, a pipeline extends from a Wheelus facility into the sea where it can hook onto U. S. tankers. This line, Coward says, "can keep us from getting trapped here" when and if the time for such a contingency should ever arrive.

Wheelus also is relatively unprotected from attack by any invading aerial force, relying primarily upon isolation and distance for security, although a "limited intercept capability" is maintained with the interceptors here for training plus some base aircraft. Wheelus officials believe a more elaborate defense system would yield little in actual protection. "We're sitting out here all alone," one spokesman explains, "and there aren't any contiguous defenses. Our radars, for instance, aren't tied in with anyone else's, and it would be impossible for us to have a really tight defense." ◆◆

Work Loss Cut Sharply at Missile Sites

Washington—Labor-management harmony reached a new high at U. S. missile bases in the quarter ending Aug. 31, according to figures on man-days lost through strikes and other work stoppages.

The Missile Sites Labor Commission, appointed by President Kennedy last May 26, reported that 768 man-days were lost at Air Force missile bases in June, July and August of this year, compared with 34,377 man-days in the same period of 1960.

These are the commission's month-by-month comparisons, with the 1960 man-days lost listed first and the 1961 man-days lost listed second: June, 33,026 and 312; July, 442 and 250; August, 909 and 206.

Julius E. Kuczma, executive secretary of the commission, told Aviation Week the number of man-days lost in the quarter ending Aug. 31 is the lowest recorded for any three-month period since missile installations reached their present level of activity.

The work of the labor commission plus the activity of union leaders and Air Force officers at the missile sites are generally credited with bringing about this new degree of harmony.

Secretary of Labor Arthur J. Goldberg, chairman of the commission, recently told President Kennedy that this decrease in work stoppages proves the value of one commission and "is concrete testimony of the desire of labor and management to cooperate in making sure that work on our missile and space programs goes forward uninterrupted." Sen. John L. McClellan (D.-Ark.), whose Senate investigation brought the work stoppages to public attention, is among those who have praised the effectiveness of the commission (AW May 22, p. 77).

One of the first things the commission did was to establish labor relations committees at each of the missile bases. Local union leaders, contractors and a mediator assigned by the Federal Mediation and Conciliation Service serve on each committee. Their job is to resolve a dispute before it gets out of hand and results in a strike or walk-off. The committees also can refer problems up to the presidential labor commission level when necessary.

C. J. Haggerty, president of the AFL-CIO Building and Construction Trades Department, told Aviation Week the presidential commission and on-site committees have provided long-needed machinery for settling disputes. Last year, he said, labor leaders tried to get such machinery but the Air Force took a hands-off attitude, and labor's "one recourse was to go home."

Until President Kennedy took the missile work stoppages under study, "no official of this government had said this missile program was an urgent one," Haggerty said.

Such a high-level pronouncement was needed to assist international union leaders in their efforts to stop strikes, he said.

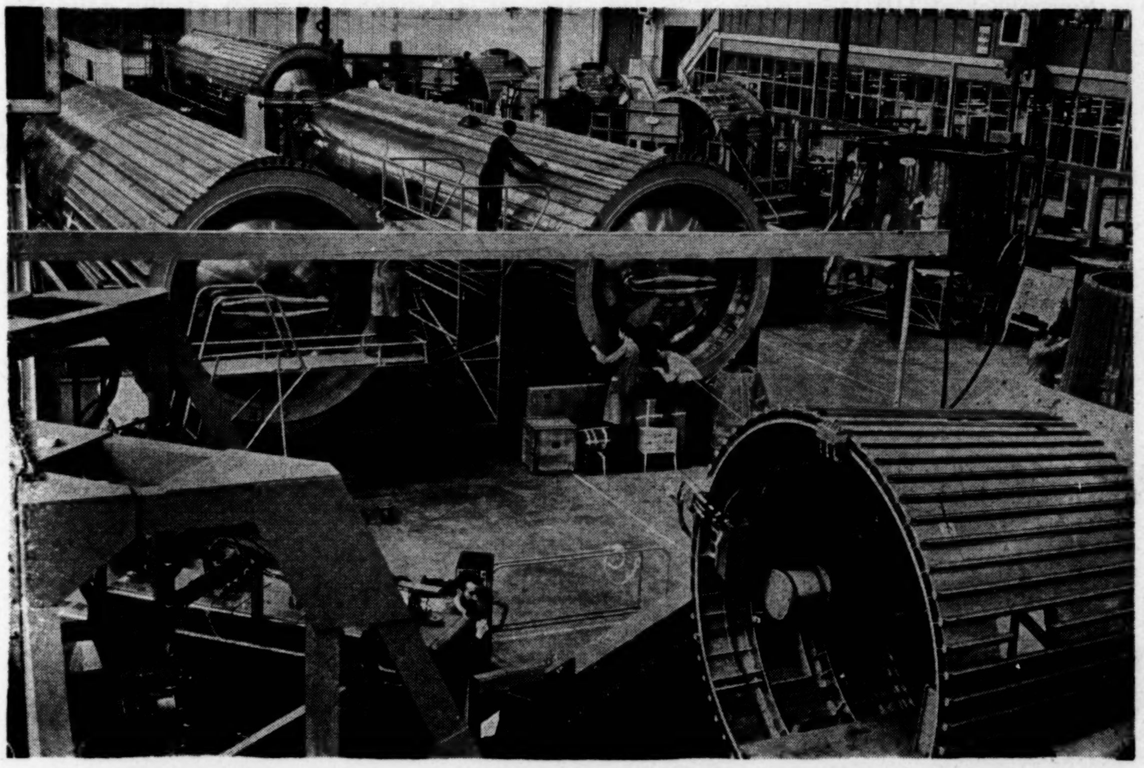
Kuczma said the cooperative approach to labor problems at missile bases represents "a new concept of settlement that really works. . . . All parties found a crystalization" when the labor commission and local committees were established, he said, and "we've got somewhere to go now."

A further impetus for resolving disputes at missile bases is the threat of legislation prohibiting strikes. Haggerty conceded this was a factor in reducing work stoppages, but said it was "a secondary one."

Sen. McClellan still intends to introduce such a bill, but it has no chance at all of receiving action at this session of Congress.

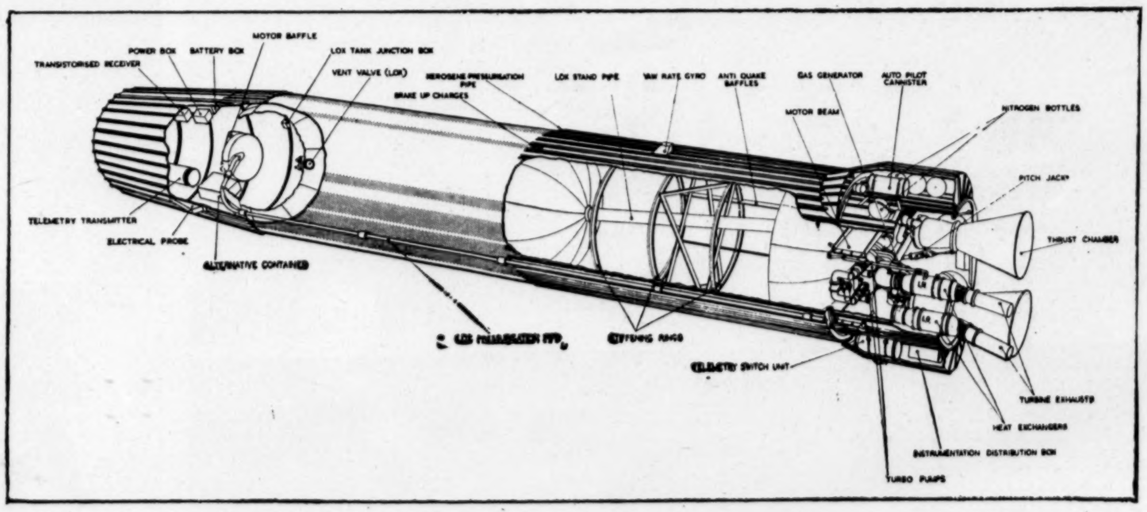
Air Force has not involved itself directly in labor disputes at its missile bases. But a spokesman said Air Force officers now work with the on-site committees.

In general, Air Force is displaying a new attitude toward labor problems by doing whatever it can to solve them without taking sides in the dispute, but no directive setting forth this new policy has been issued, he said.

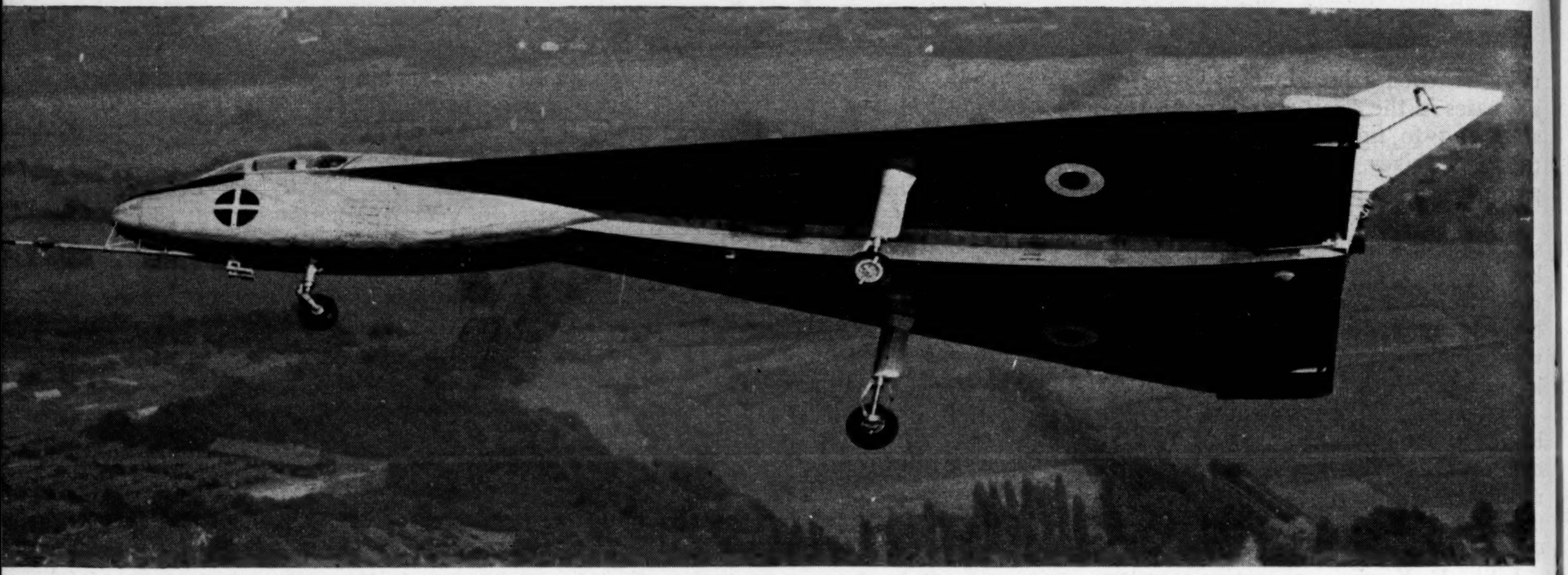


British Construct Blue Streak Boosters

Sections of the de Havilland Blue Streak booster which will be used in the forthcoming European space program are shown under construction at de Havilland's Stevenage main assembly works. Blue Streak, which will be the first stage of the European launcher, is 70 ft. long and 10 ft. in diameter. Forward tank holds 60 tons of liquid oxygen and behind that is another tank holding 26 tons of kerosene. Vehicle has no wings or fins; control is by gimbaling the two Rolls-Royce RZ.12 engines (AW July 17, p. 57). Initially designed as a military weapon, Blue Streak was modified for its space launching role by redesigning the top bay to fit a second stage, the French Veronique, rather than a warhead.

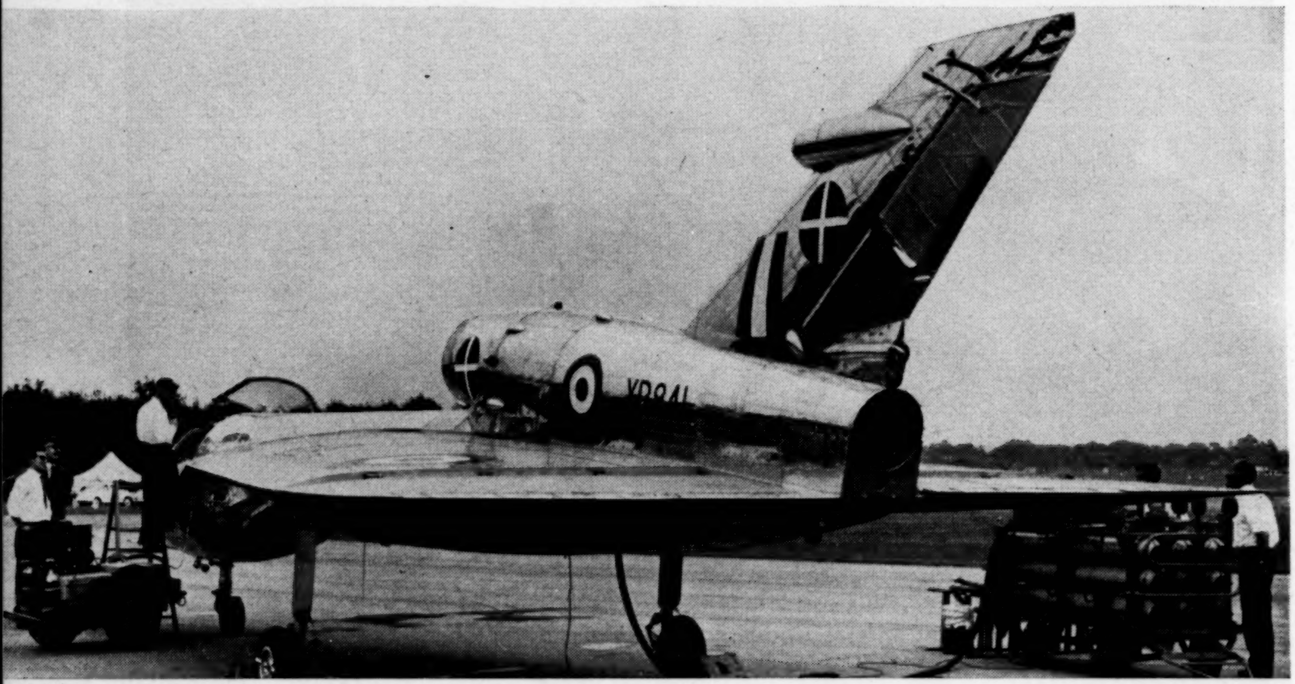


AERONAUTICAL ENGINEERING



Sweepback of HP 115's wing is 76 deg. Aircraft is designed for study of slim delta shapes at low speed regimes.

Handley Page Displays HP 115 Research Plant



Handley Page 115 delta-wing research airplane was a daily participant in the 22nd annual flying display of the Society of British Aircraft Constructors, Farnborough, England (AW Sept. 11, p. 22). Flights were limited to 5-7 min.—just enough time for one pass over the field. HP 115 cockpit is entered by means of an ordinary stepladder (left). Bulge on leading edge of the vertical stabilizer (below, left) houses camera which will photograph the tufted delta wing during low-speed flight tests. Maximum speed of the HP 115 is about 300 mph. The aircraft has two perforated speed brakes inboard from the landing gear (below, right). Angle of attack is controlled by the pilot by means of hydraulic actuators. The HP 115 will explore the flight characteristics of slim delta-wing aircraft in con-

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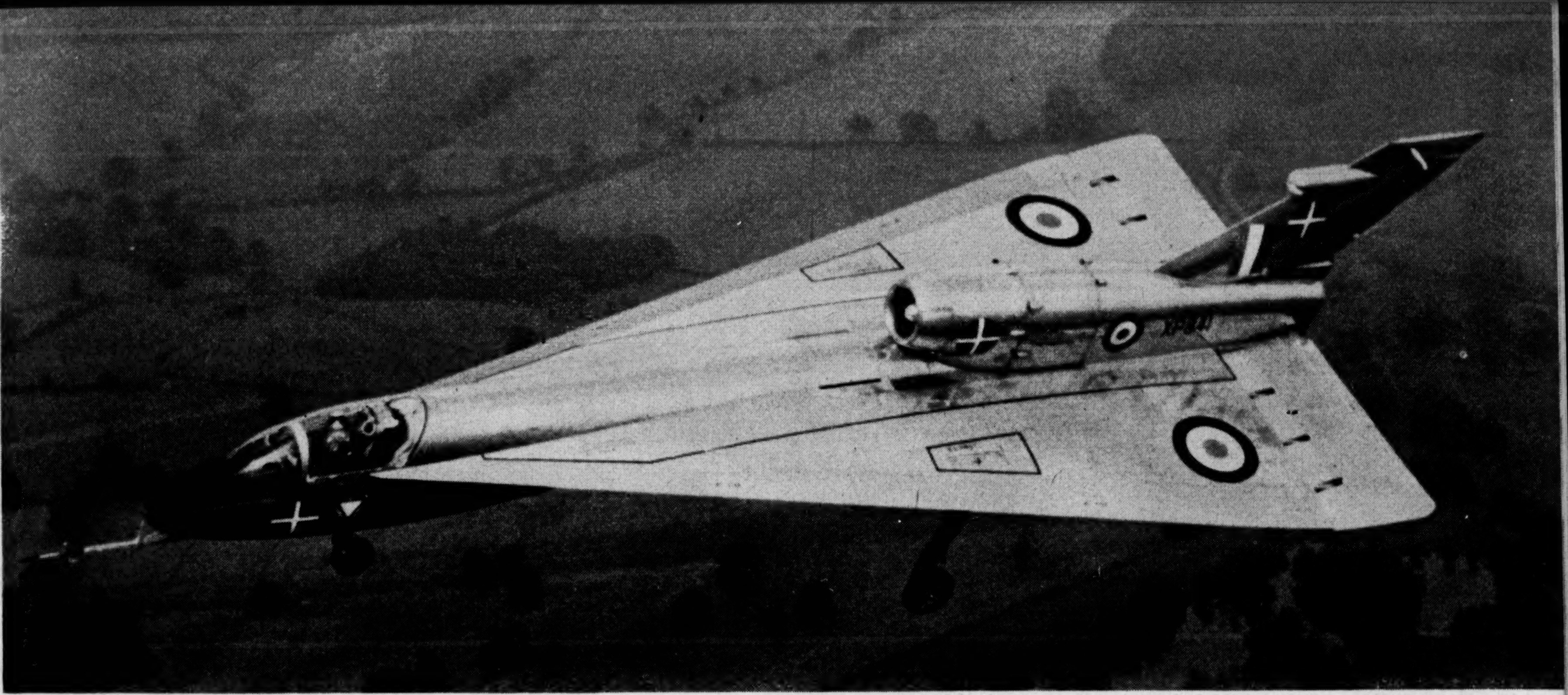
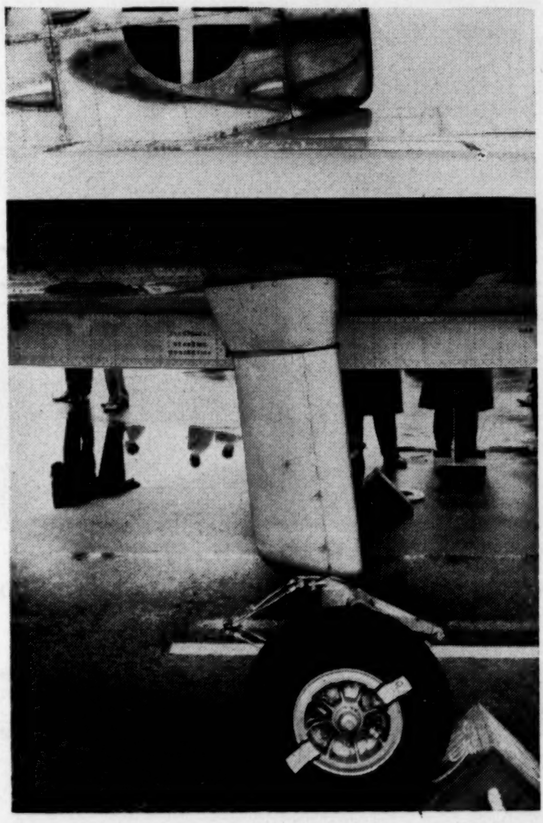


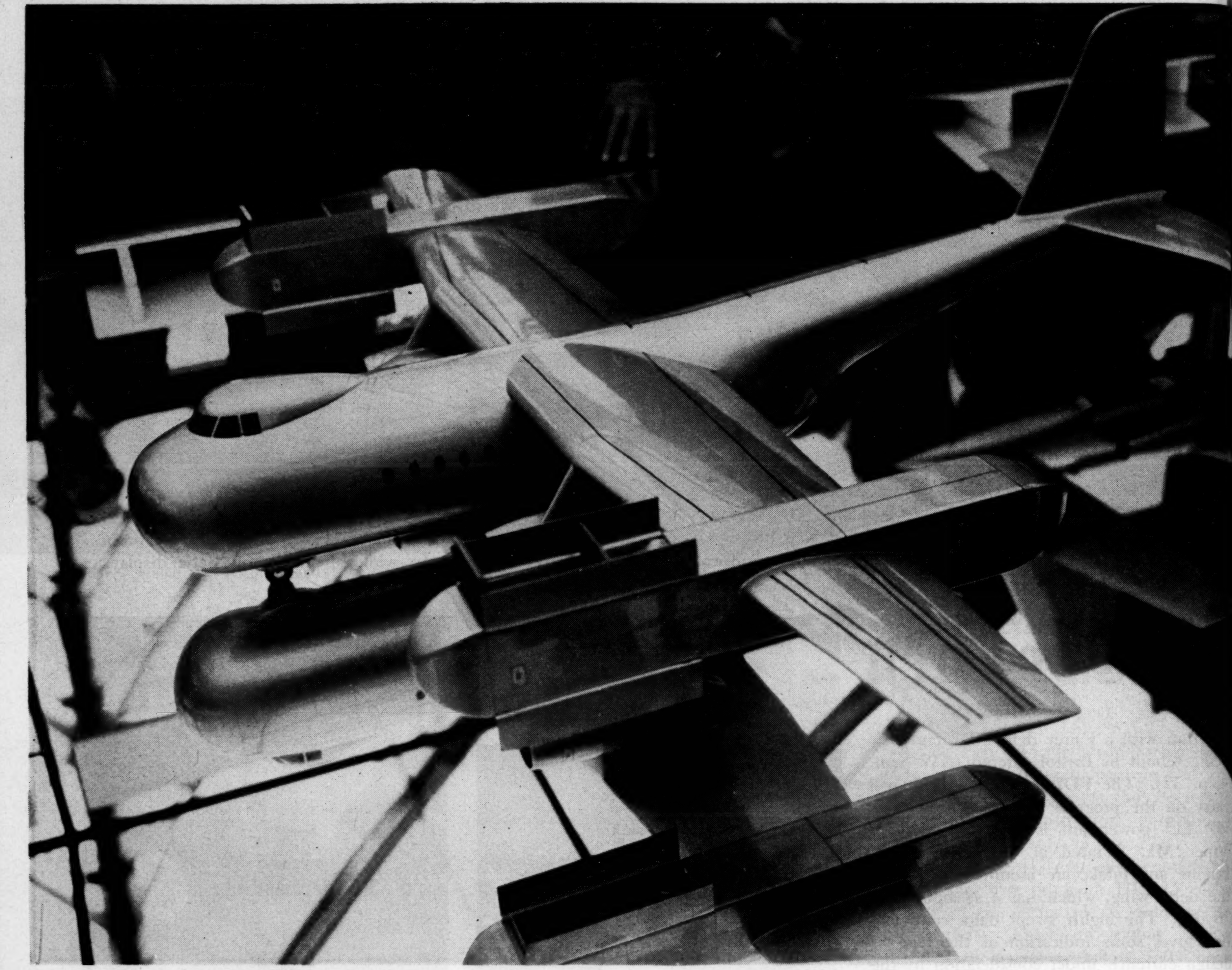
Handley Page 115 makes flypast at Farnborough. Aircraft will begin flight tests soon at altitudes of about 10,000 ft. Landing gear (below, left) does not retract and is designed to take stress of repeated tests. Nose instrumentation (below, right) includes probes to measure angles of attack and yaw; note protective cylindrical shield installed on tip of probe while aircraft is on static display.

lan t Farnborough

junction with a Fairey delta FD2 currently being rebuilt by Bristol Aircraft (AW Sept. 4, p. 37). The FD2, when modified, will carry on the program at high speeds. The HP 115 powerplant is a Bristol Siddeley Viper Mk. 9 rated at 1,900 lb. thrust. Engine and intake are mounted on top of the delta wing, which has a sweepback of 76 deg. The highly swept delta configuration gives some indication of the type of design currently under consideration by the British Ministry of Aviation. Handley Page built the HP 115 under contract from the Ministry of Aviation. The research plane is 45 ft. long and has a 20 ft. wingspan. It is heavily instrumented for its research role and its fixed landing gear is stressed to withstand repeated landing shocks (AW Aug. 28, p. 34).

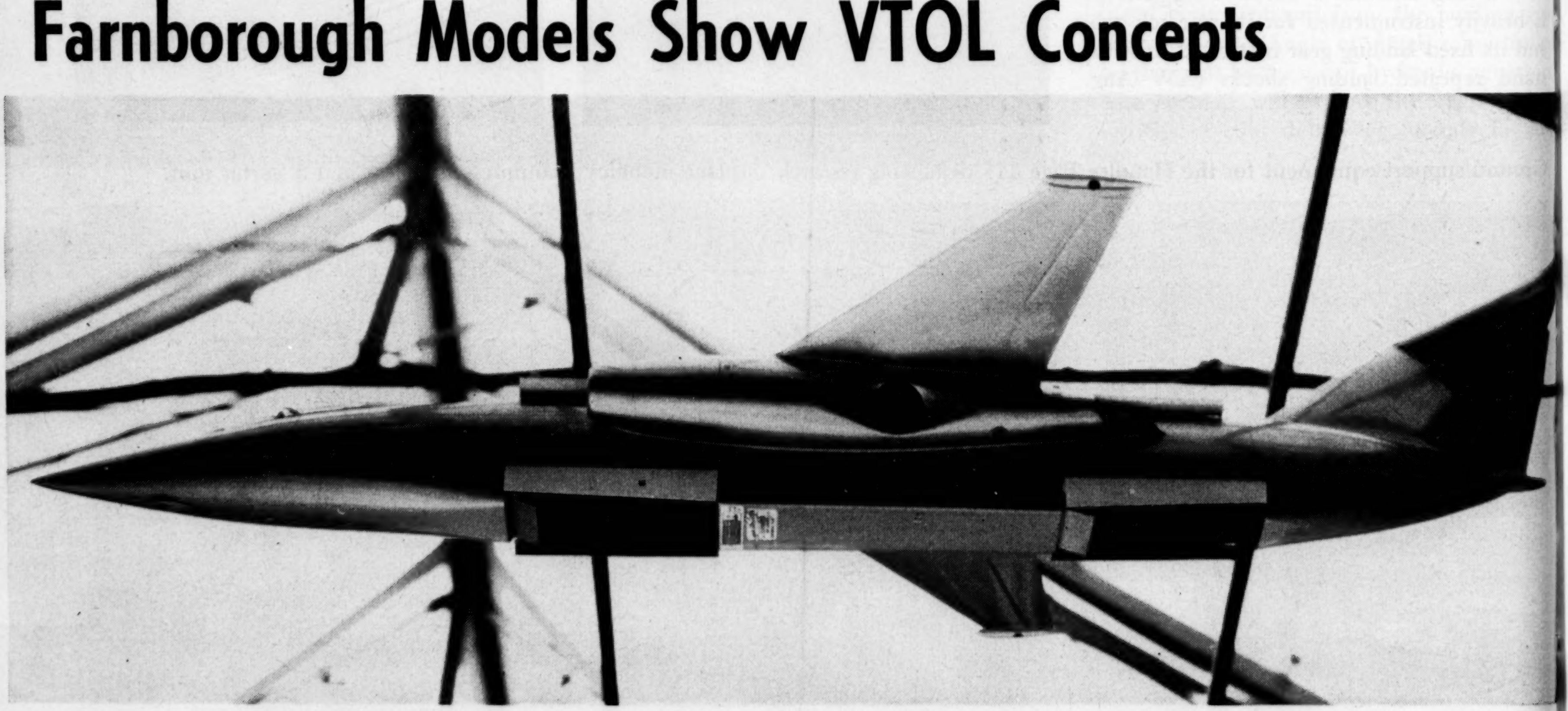


Ground support equipment for the Handley Page 115 delta-wing research airplane includes a compressed air car and a starter unit.

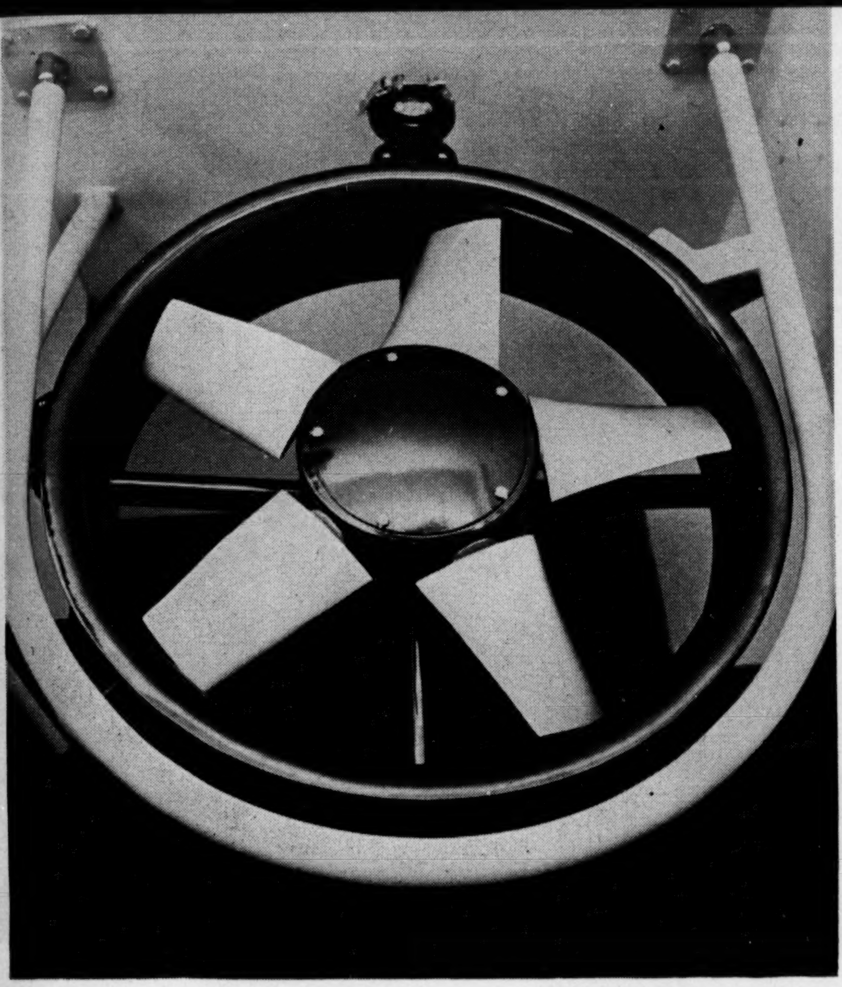


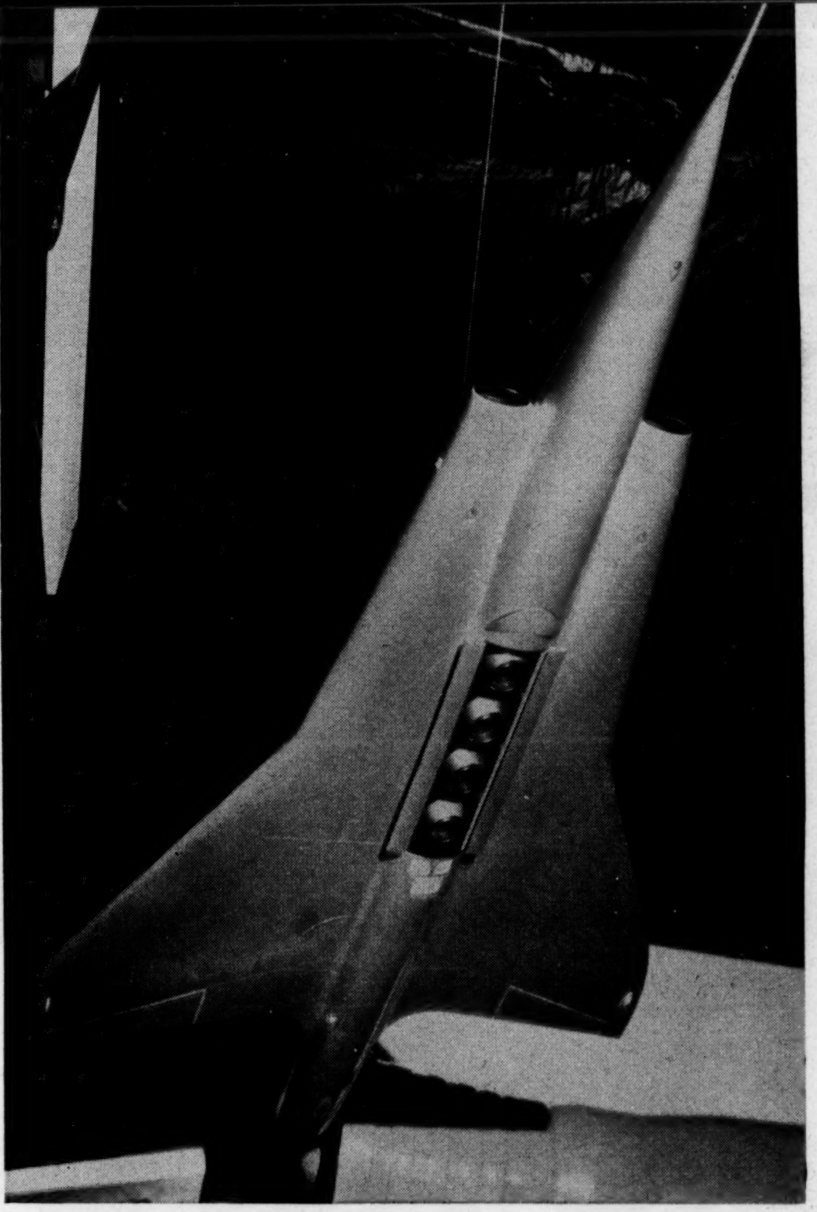
Possible Rolls-Royce V/STOL tactical freighter would use Rolls-Royce RB.162 lift engines housed in wing pods for vertical flight. Power for horizontal flight is supplied by four turbojet engines of 15,000 lb. thrust each, podded dually under wing and barely visible inboard of lift engines. Model is positioned on a mirror which reflects underside.

Farnborough Models Show VTOL Concepts

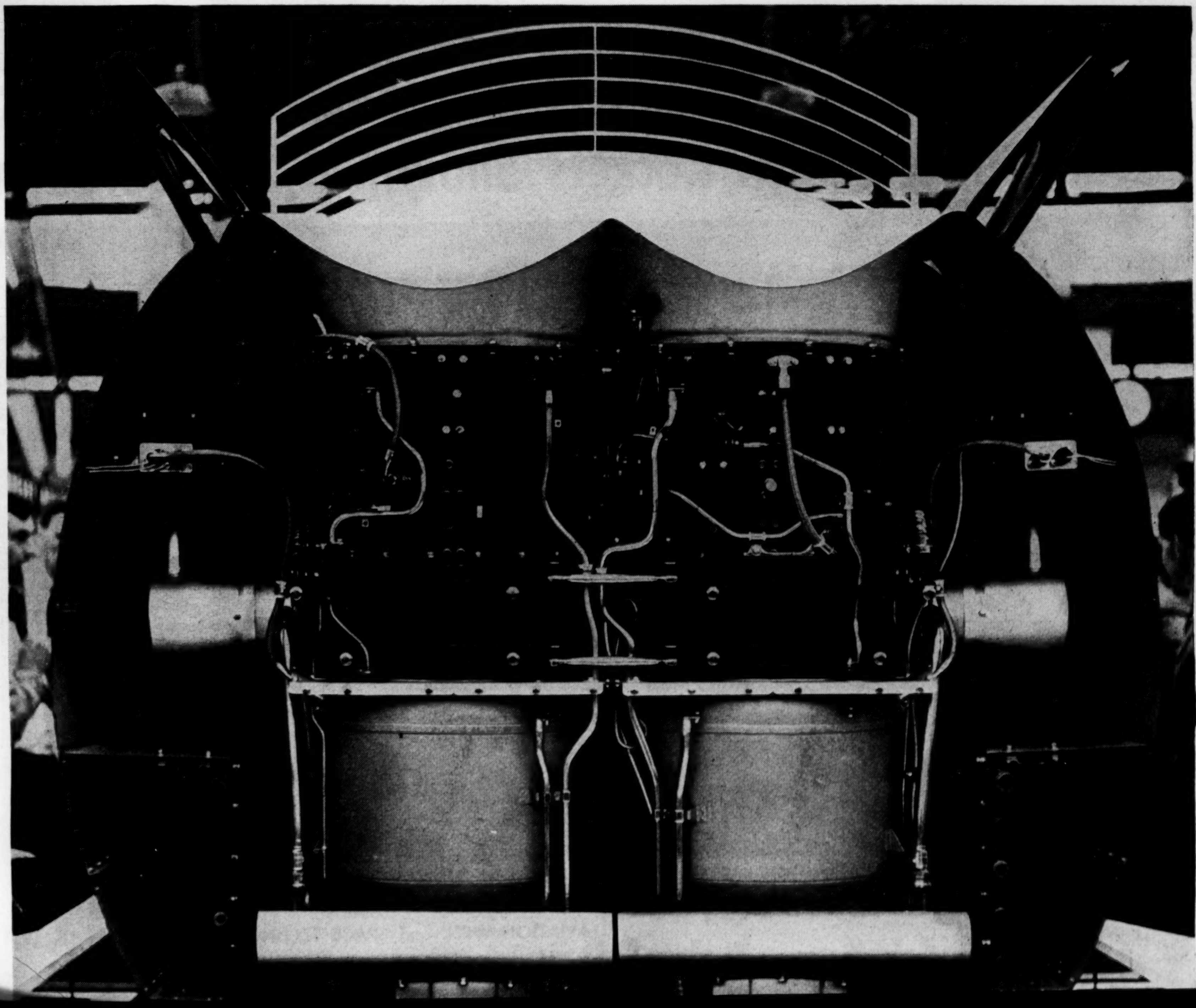


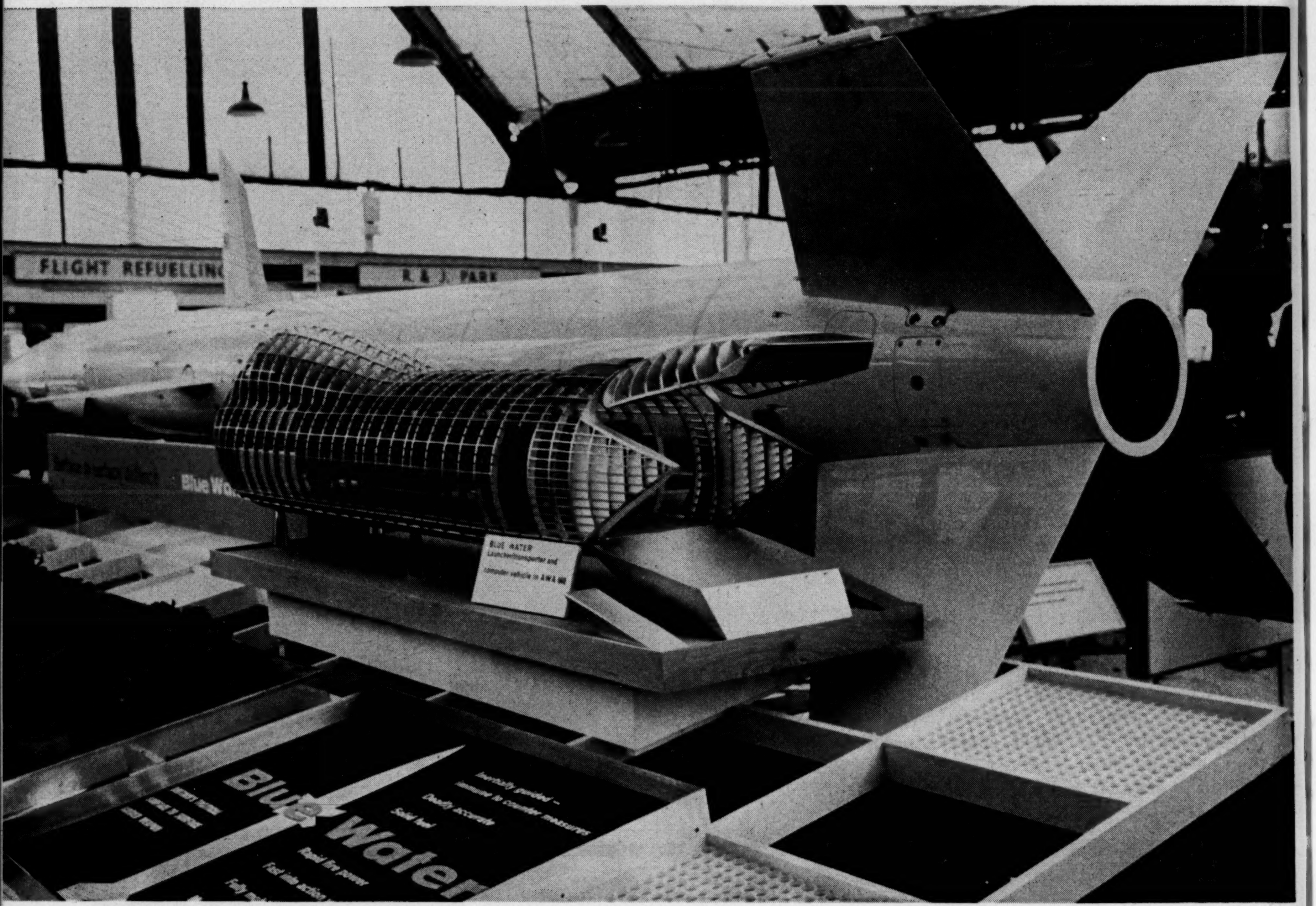
Supersonic Rolls-Royce V/STOL would have four 6,000 lb. thrust RB.162 lift engines housed internally behind hinged streamlining doors.





Four in-line RB.162s provide lift thrust for V/STOL fighter under development by Sud-Dassault consortium (above, right). Lift fan engine (above) designed by Rotol can produce up to 2,400 lb. thrust. Below, paired 2,500 lb. thrust Rolls-Royce RB.108 lift engines power the Short SC.1 test vehicle used to evaluate Rolls' concept of separate lift and propulsion engines.




FLIGHT REFUELLING
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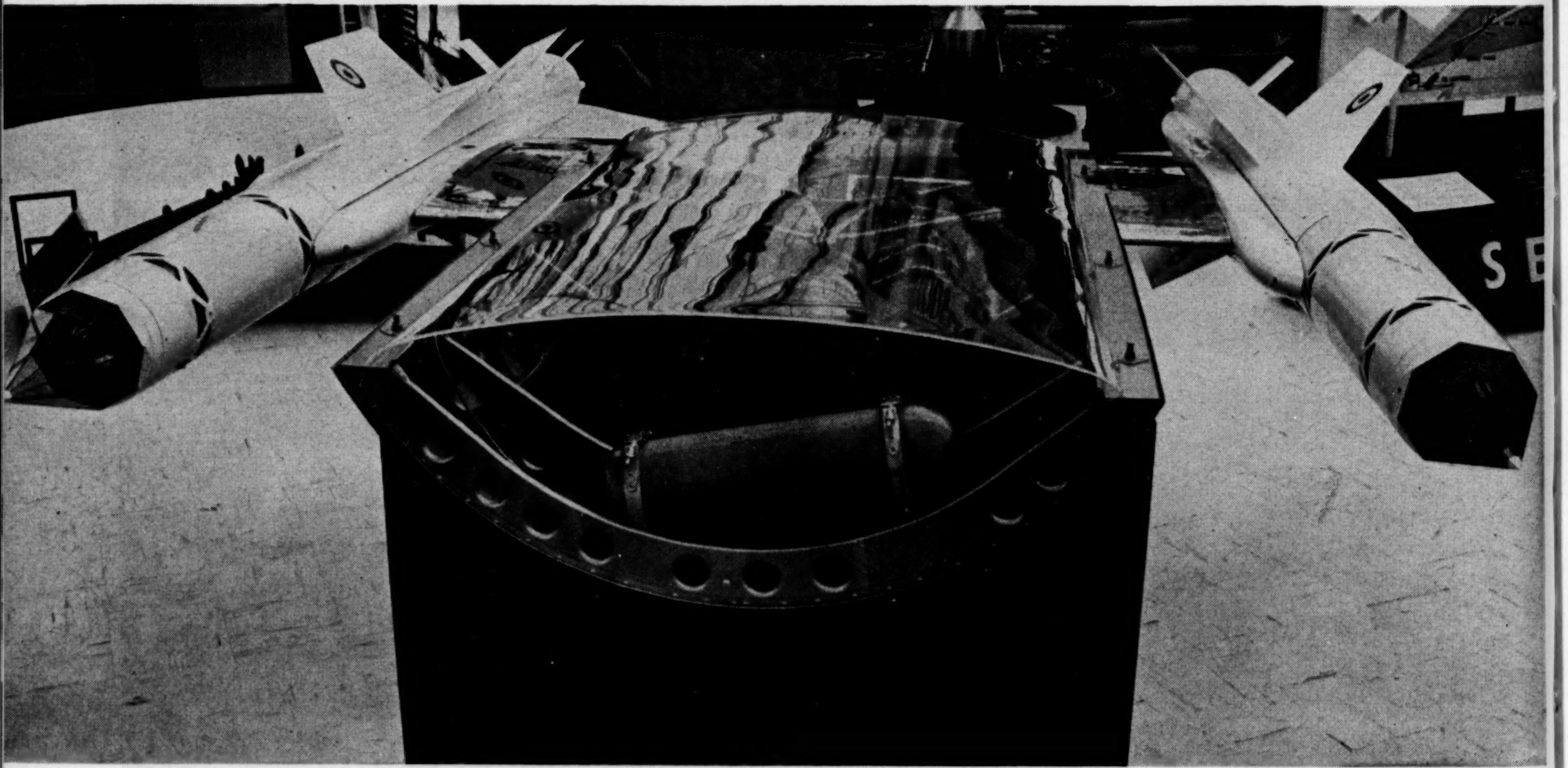
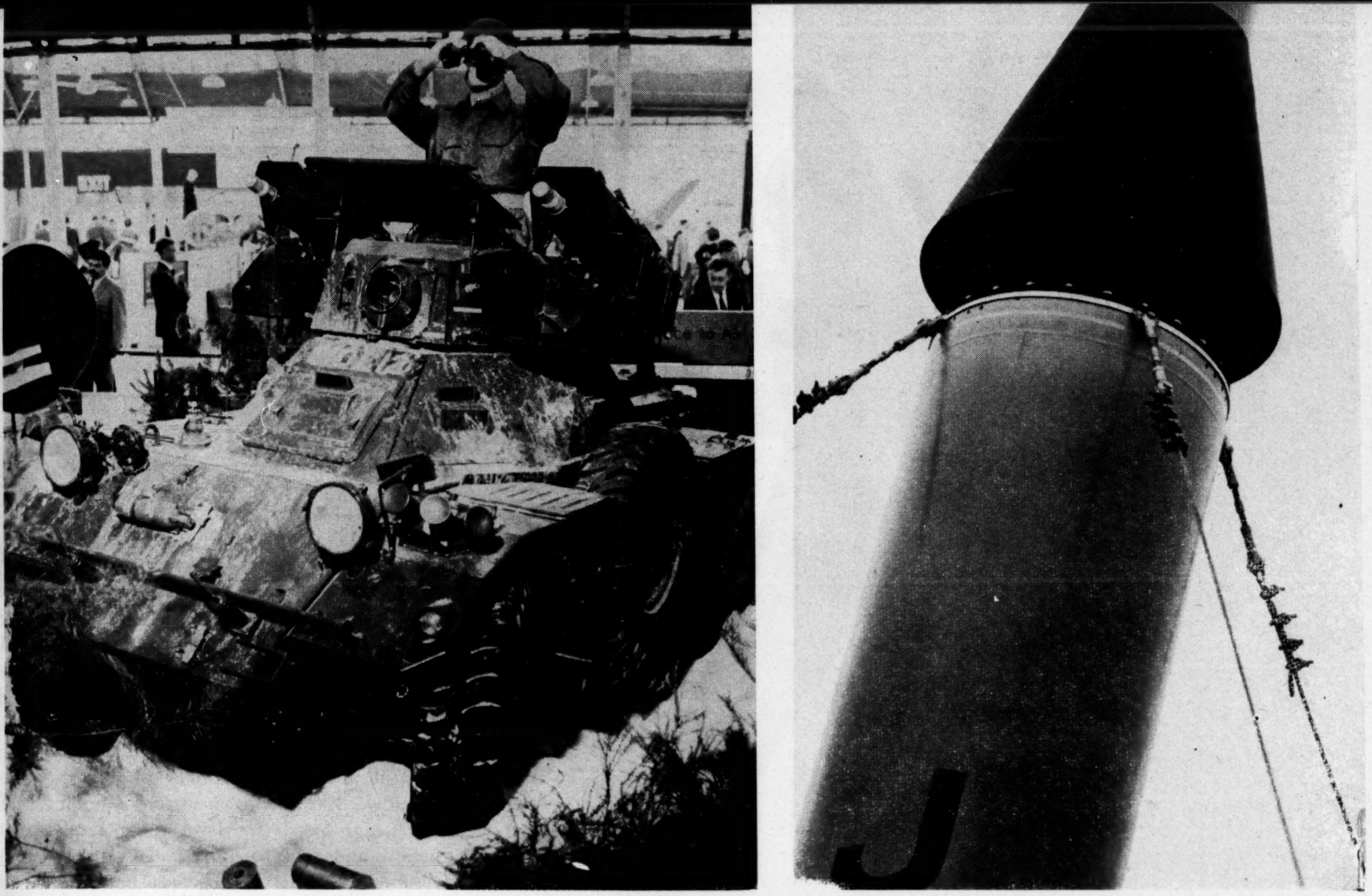
Blue Water
BLUE WATER Launcher/transporter and computer vehicle in AW.660
Blue Water
Inertially guided — immune to counter measures
Deadly accurate
Solid fuel
Rapid fire power
Fast into action

Blue Water surface-to-surface missile is shown with a framework mockup or the Argosy 660 transport, which would carry the missile and its launcher/transporter/computer vehicle. Blue Water is 25 ft. long and has a range of up to 60 mi. Solid fuel rocket is inertially guided.

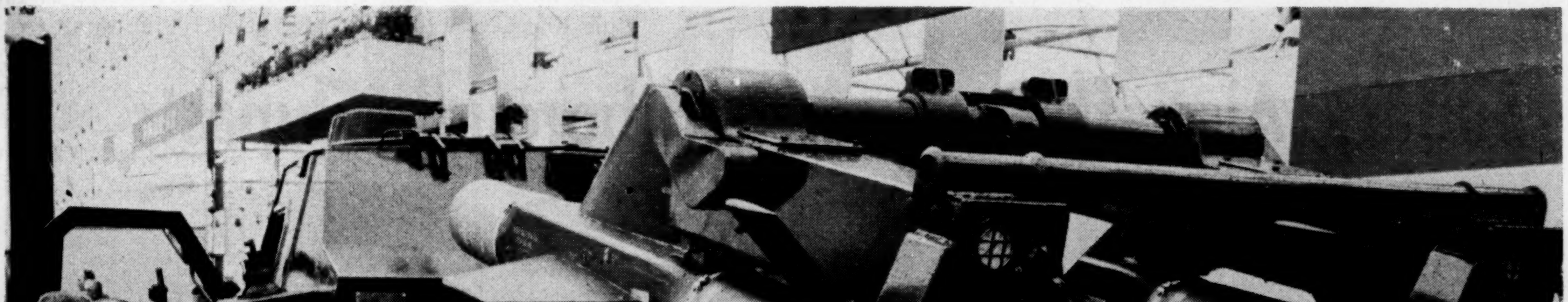
Tactical, Research Rockets Shown at Farnborough



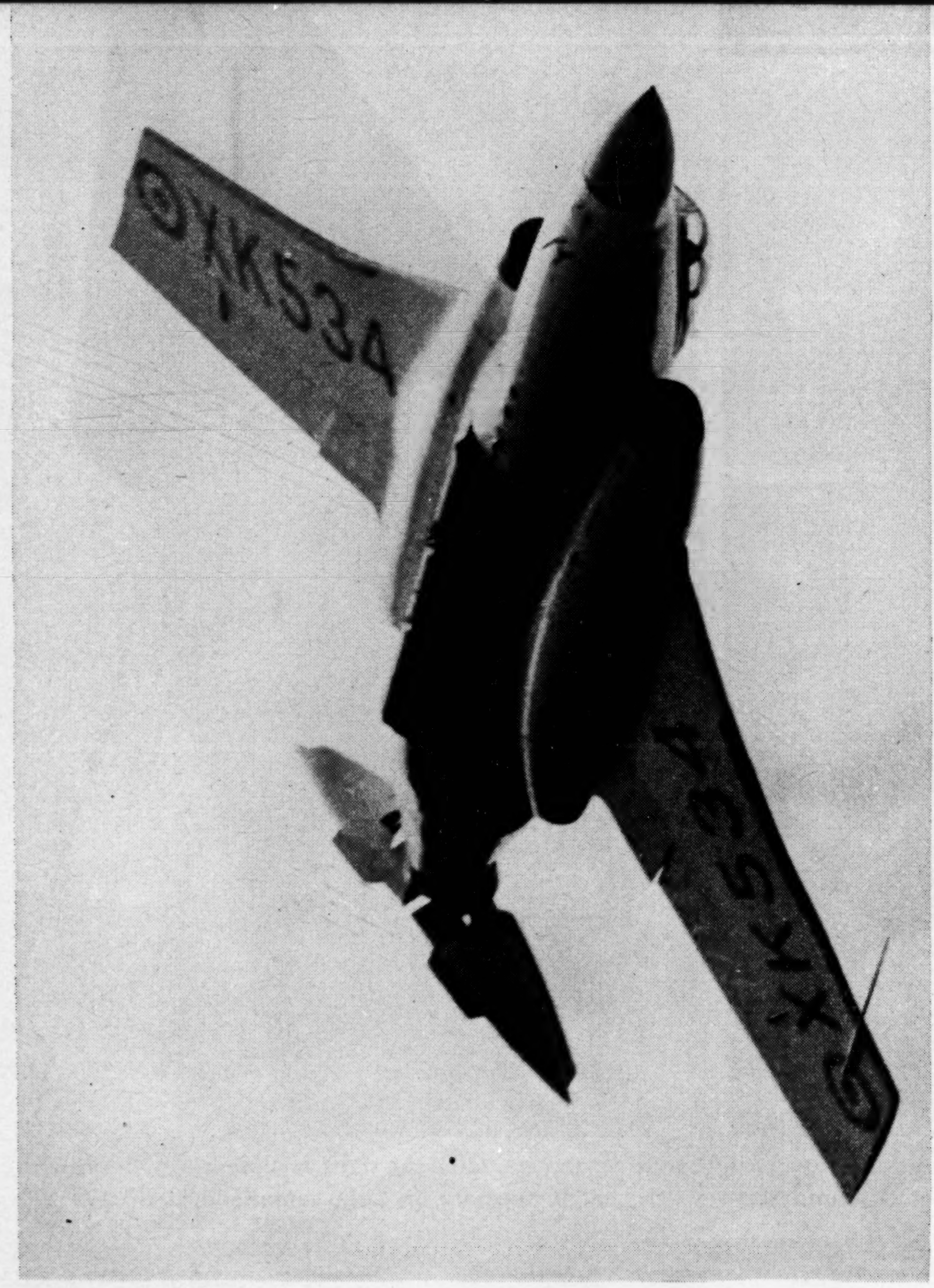
De Havilland Firestreak air-to-air missiles are mounted on gunpack installations for English Electric fighter aircraft.

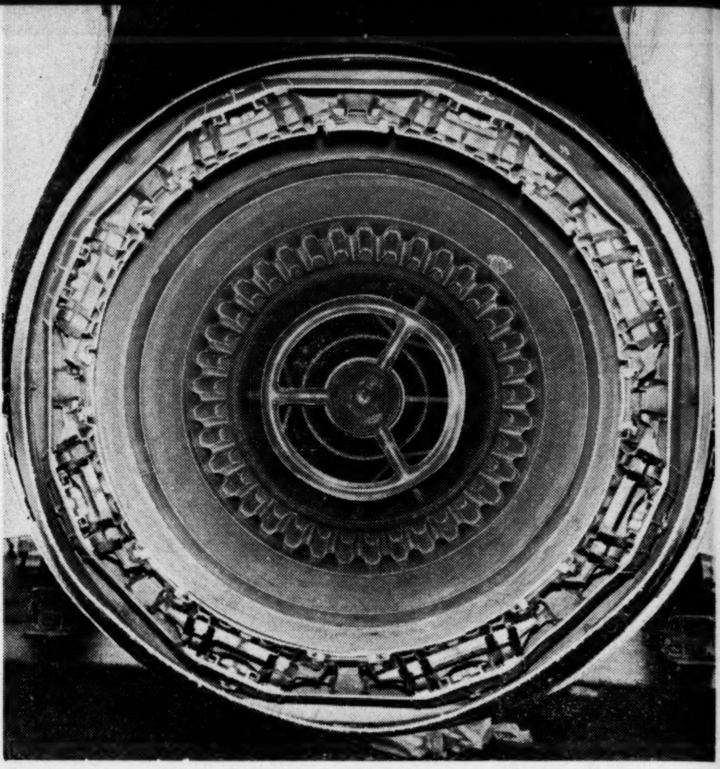


Two Vickers Vigilant anti-tank missiles are mounted in firing position on Ferret scout car (above, left). At right is closeup of the juncture of first and second stages of a three-stage Jaguar research rocket. Second stage is designed to separate on radio command at 80,000 ft.



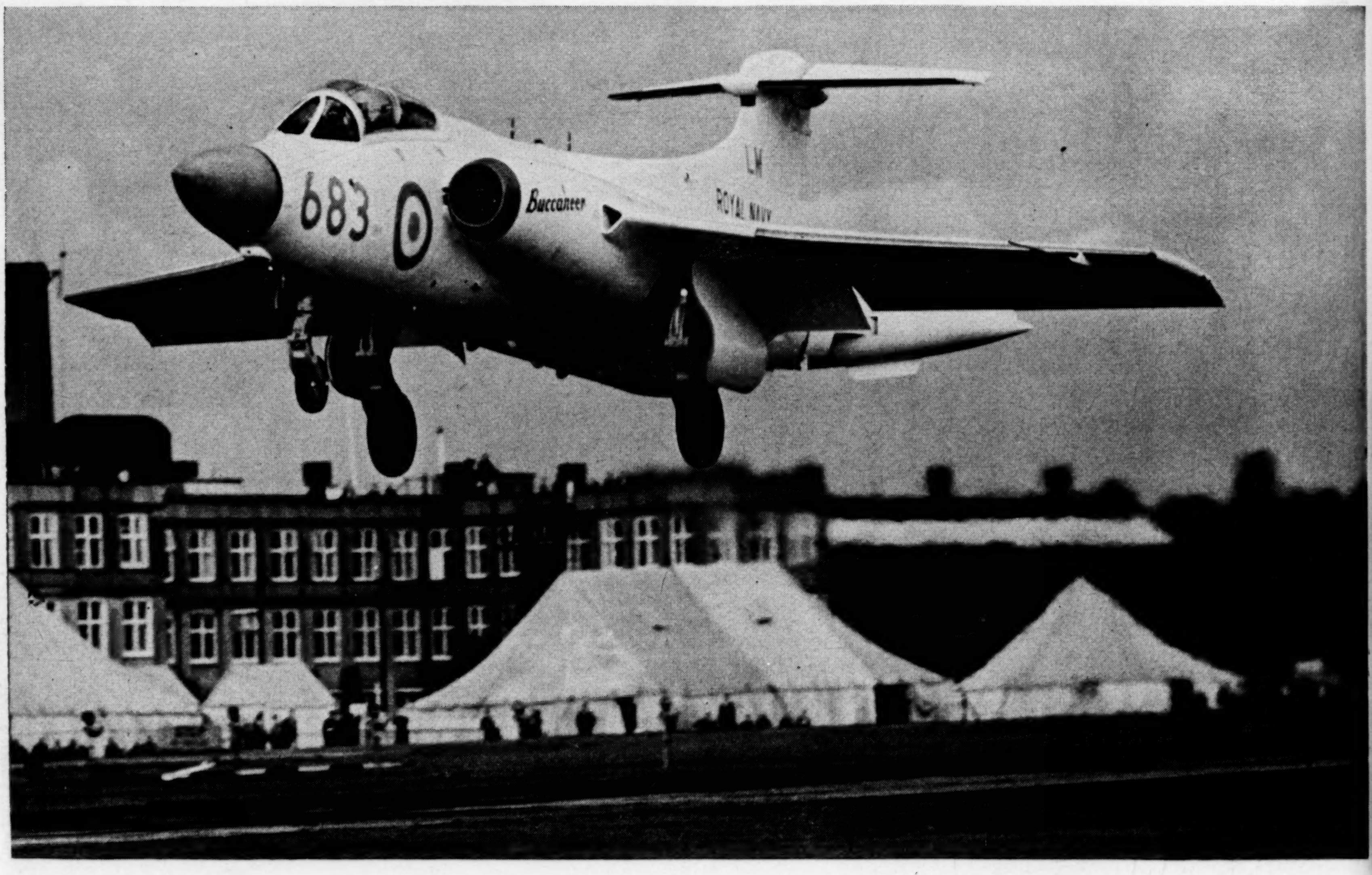
Australian-built Malkara anti-tank missiles are mounted in transport position on an armored launch vehicle which can carry four missiles. Vehicle is air transportable. Malkara, designed by Fairey Engineering, is built in government aircraft factories in Melbourne.

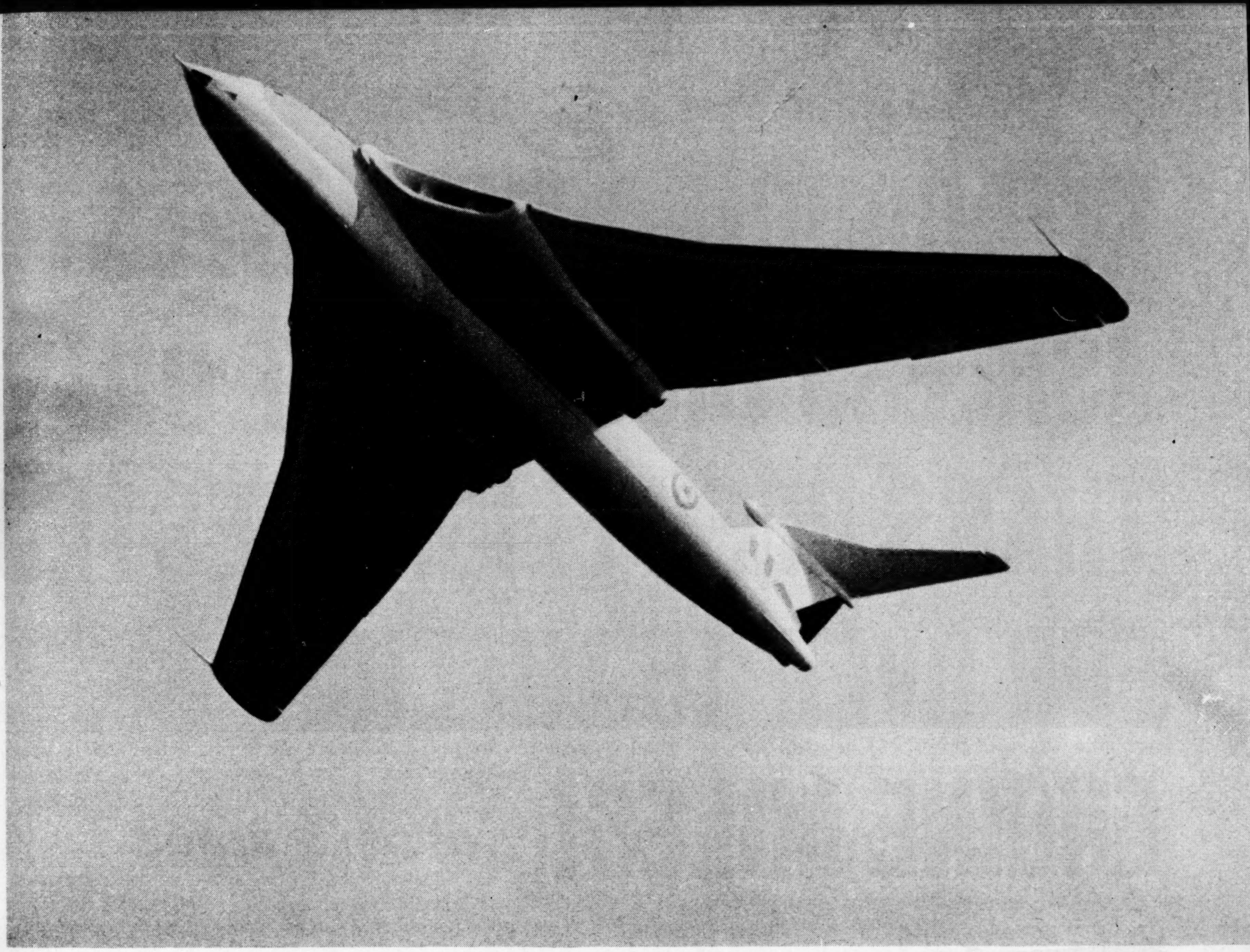




Closeup of aft end of English Electric Lightning's lower Rolls-Royce Avon turbojet is above. Variable-area nozzle and its actuators are visible, with V-gutter flameholder of the afterburner forming the central ring. At left, Blackburn Buccaneer's bomb bay is in process of rotating as the aircraft passes over Farnborough with speed brakes extended. Dorsal and ventral strakes on speed brakes are visible. Below, Mk. 1 Buccaneer strike fighter lands after making a high-speed, low-level run. This version is in production and will be in Royal Navy squadron service by year-end. Bullet fairing has been added to horizontal tail at juncture of vertical stabilizer. Mk. 1 is powered by two de Havilland Gyron Juniors rated at 7,000 lb. thrust. Mk. 2 version will be powered by two Rolls-Royce Spey turbojets rated at 10,100 lb. thrust.

Military Aircraft Perform Farnborough Flypasts





Handley Page Victor B.2 bomber makes flypast at Farnborough. Below, a Supermarine Scimitar catches cable of Royal Aircraft Establishment-Dunlop runway arresting gear and unreels nylon webbing from energy-absorbing drums anchored adjacent to runway.

100
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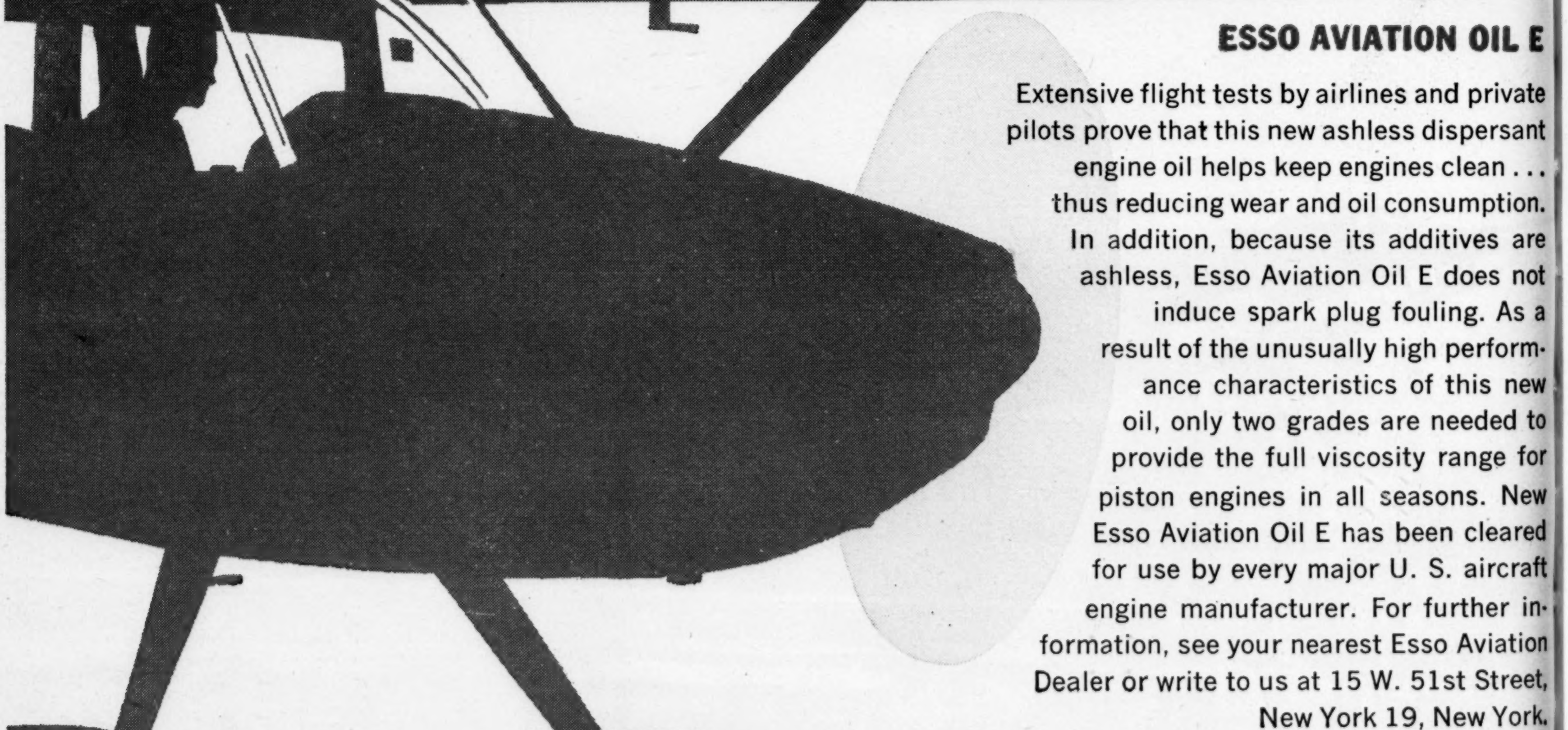

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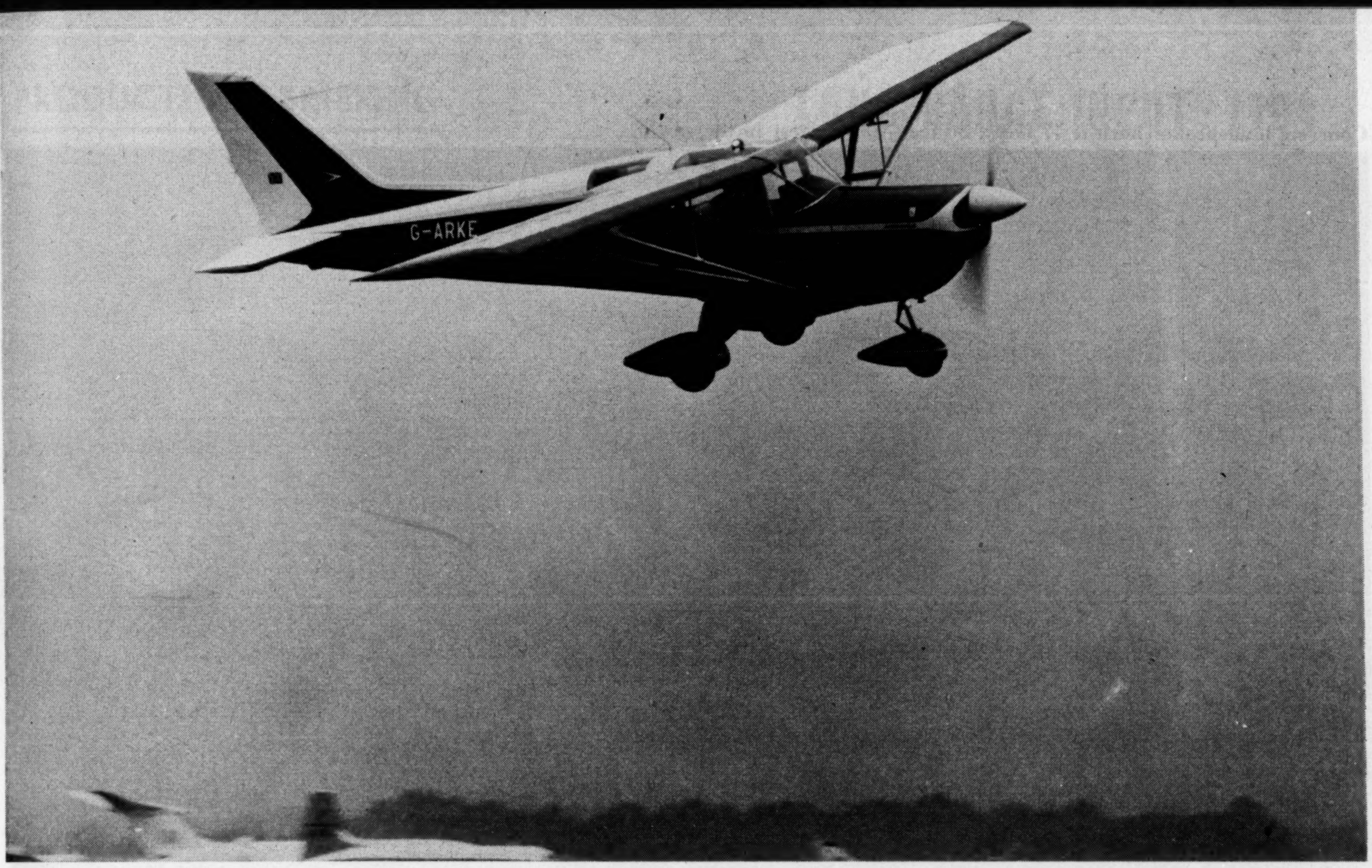
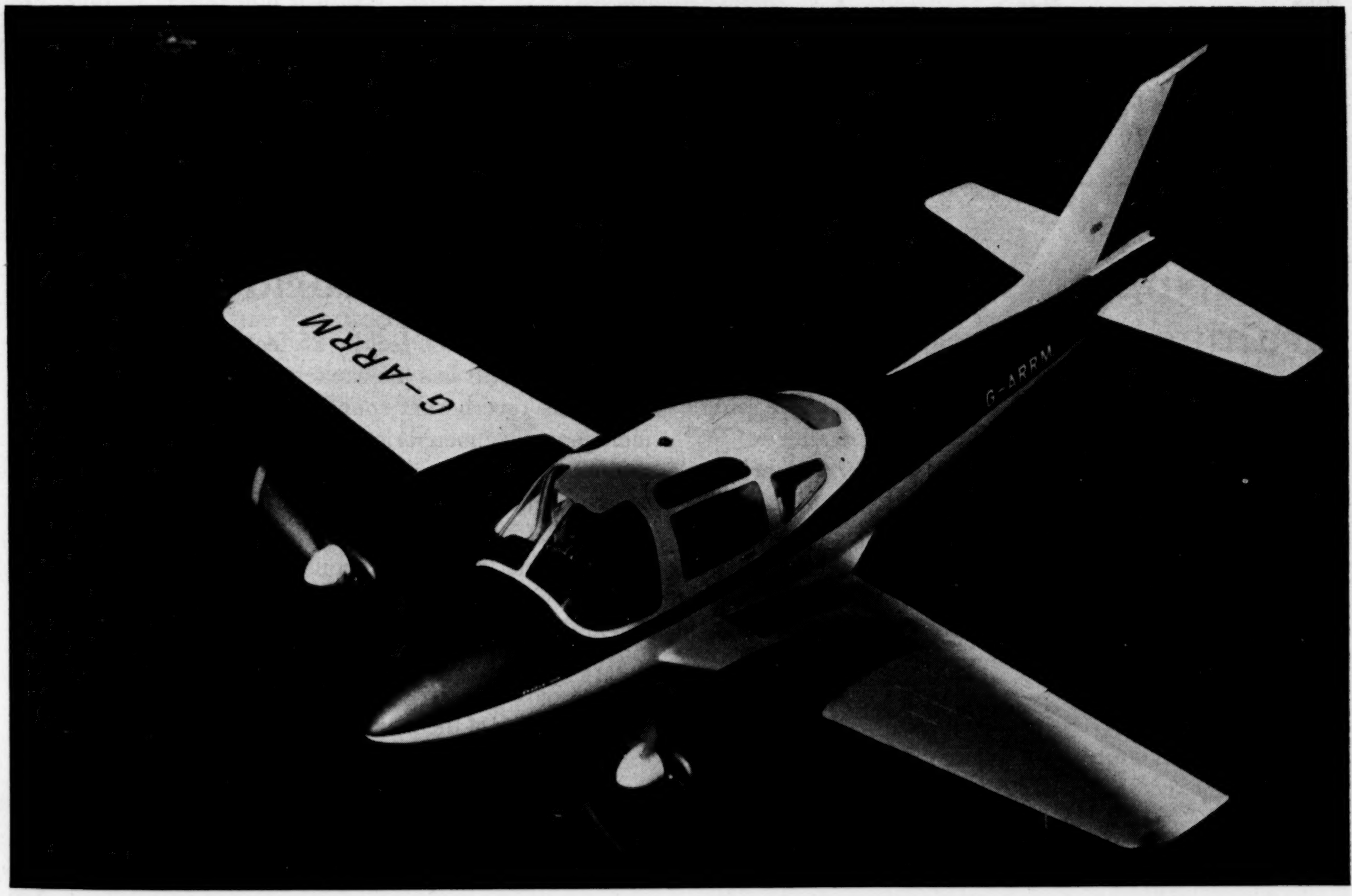


Beagle A.109 Airedale, first to fly of the aircraft designed by British Executive & General Aviation, Ltd., makes a low pass at the Farnborough Air Show. Airedale is powered by a 175-hp. Rolls-Royce Continental GO300. Maximum range with optional tanks is 1,050 mi.

New British Executive Planes Displayed at Show

Beagle 206, newest British executive aircraft, still was fitted with test equipment when shown at Farnborough. The plane can carry five to seven passengers and is powered by two Rolls-Royce Continental IO470 260-hp. engines. B.206 is a prototype.



Concrete loudspeaker horn is 47 feet x 30 feet—the largest in the world.

Mach 3 Technology

Torturing aircraft structures with the world's largest "gramaphone" To predetermine in-flight stresses on an aircraft as advanced as the Air Force's Mach 3 B-70 Valkyrie, it was necessary to make sweeping advances in the state-of-the-art of testing procedures.

One way the Los Angeles Division of North American Aviation met this challenge was to build the largest, loudest acoustical test chamber in the world. Here, a mammoth 47 foot by 30 foot concrete loudspeaker horn can blast aircraft structural specimens with up to 170 decibels of noise. This is the equivalent of 54,000 five-tube radios going full blast, yet ingenious soundproofing keeps this noise to no more than a discreet whisper outside the lab. The noise inside the lab is so great that the heat generated could ignite fiber glass insulating material.

Specimens up to 6 feet by 25 feet can be tested in the acoustical lab. It has the capacity for: progressive wave as well as reverberant sound fields; grazing or normal incidence specimen orientation; discrete frequency or random noise at sound levels up to 170 dbs; thermal environment testing from −100°F to +1200°F; frequencies of 50 to 10,000 cycles per second. This is indeed a remarkable facility for acoustical testing, fatigue testing, and vibration testing.

This giant acoustical laboratory can not only carry out testing on tomorrow's Mach 3 aircraft, but can perform tests on aerospace craft still ten years from reality. The lab is only one of the many that the Los Angeles Division has developed to conquer problems of space age flight.

Builders of the B-70 Valkyrie

THE LOS ANGELES DIVISION OF **NORTH AMERICAN AVIATION**

PRODUCTION BRIEFING

Kaman Aircraft Corp. has begun negotiations with the Navy for purchase of the Naval Weapons Industrial Reserve Plant, Bloomfield, Conn. Kaman has been building helicopters at the plant since 1953, presently is using it to produce and flight test H-43Bs for USAF and HU2K-1s for Navy. Building, with approximately 300,000 sq. ft. of floor space, represents almost one third of Kaman's total operating facilities. Also included in the negotiations are a 3,000-ft.-plus helicopter strip and an administration building. Navy has quoted a price of $4,227,156.

General Motors' Allison Division will continue to produce first-stage engine cases for USAF Minuteman ICBMs under a $10,935,000 contract from Thiokol Chemical Corp.

The Martin Co.'s Orlando Division has received two Army contracts obligating an additional $21 million for continued work on the Pershing missile. Contracts call for continuation of the test and reliability program and for subsequent production of missiles for delivery to combat units. Army spokesmen said formalized contracts including additional funding will be awarded in the near future.

Verson Allsteel Press Co., Chicago, will ship a 41,000-ton capacity hydraulic press to Grumman Aircraft Engineering Corp.'s Bethpage, Long Island, N. Y., facility. Press, designed for use in forming aircraft and missile components, has delivered 63,000 tons forming capacity in tests.

Telecomputing Corp., Los Angeles, will supply mobile cooling systems to North American Aviation's Autonetics Division and Northrop Corp.'s Nortronics Division for use with assembly and checkout procedures of Minuteman and Skybolt guidance systems, respectively. Both contracts total more than $300,000.

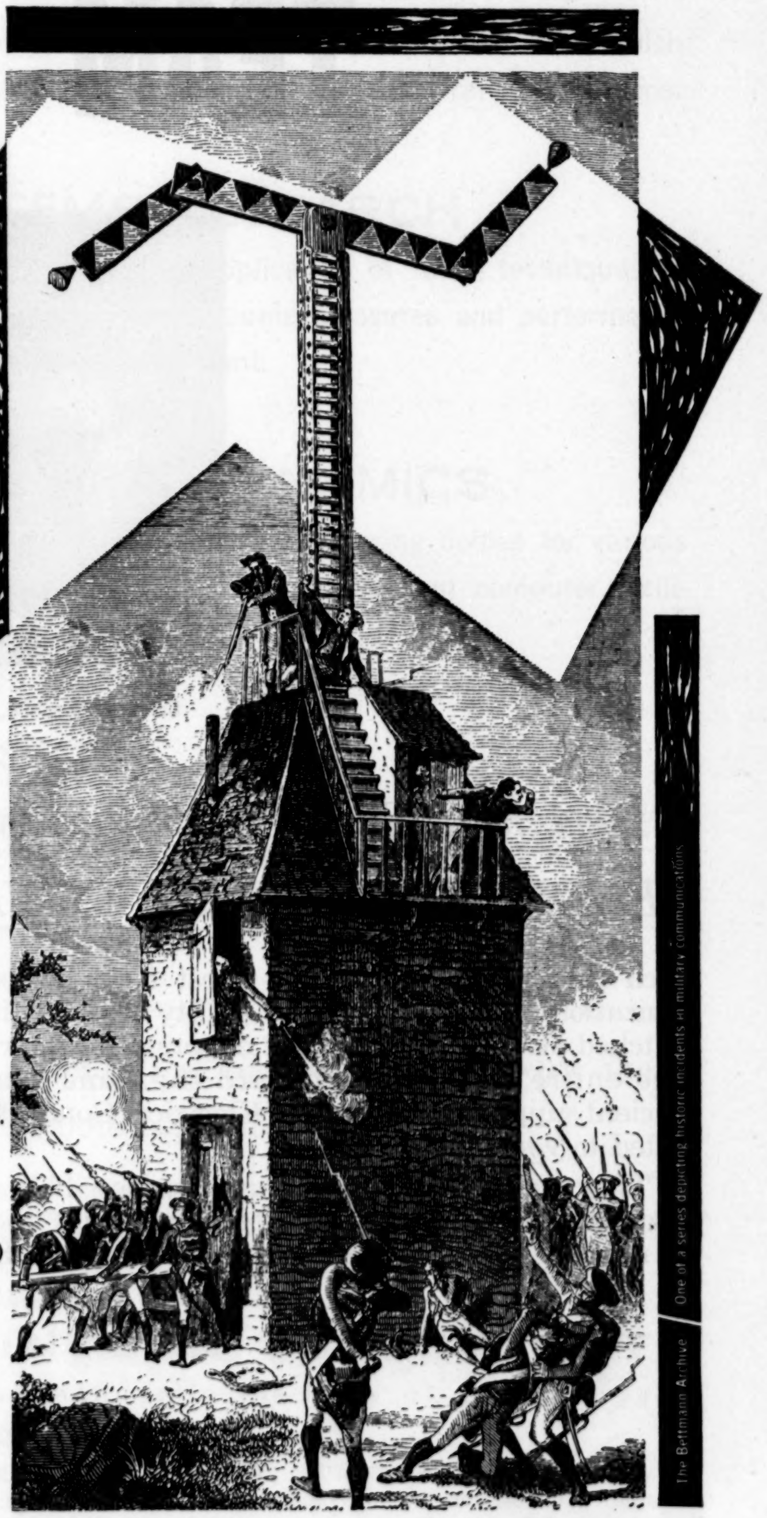
The Rucker Co., Oakland, Calif., has received a contract to design, manufacture and install a centrifuge acceleration test machine for Sandia Corp.'s laboratory in Livermore, Calif. Machine will be designed to simulate environmental g-forces in rocket acceleration and flight and will be used to test missile components.

Thiokol Chemical Corp.'s Reaction Motors Division, Denville, N. J., has received a $1,033,000 production contract for Model LR 62 RM-2 packaged liquid rocket engines to power Navy's Bullpup B air-to-surface missile.

LONG RANGE INPUT / 1794

News of the recapture of Condé from the Austrians was sped to the French Revolutionary Convention at Paris in a matter of minutes via Claude Chappe's amazing télégraphe aérienne, or relay aerial telegraph, Sept. 1, 1794. A new era in rapid communications had begun.

Today, instantaneous and completely reliable Electronic Communications insure the immediate and continuous interchange of intelligence throughout the Free World. ECI is proud of its initiative and responsibilities in the design, development and manufacture of high precision electronic equipment to the critical specifications required in various aerospace and surface roles vital to our National Defense and to scientific achievement. An example is ALRI—Airborne Long Range Input—a program where ECI communications and data link equipment fill an integral and essential requirement in linking USAF's advanced early warning system to SAGE—our continental defense network.


The Bettmann Archive | One of a series depicting historic incidents in military communications

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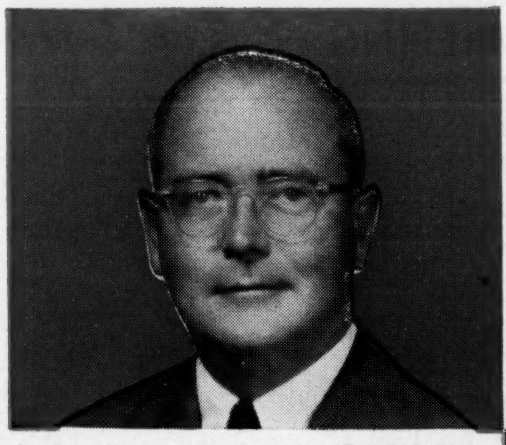
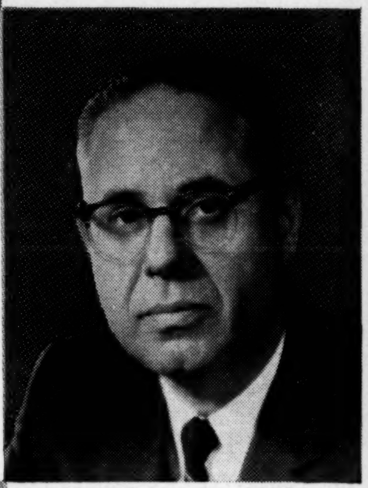
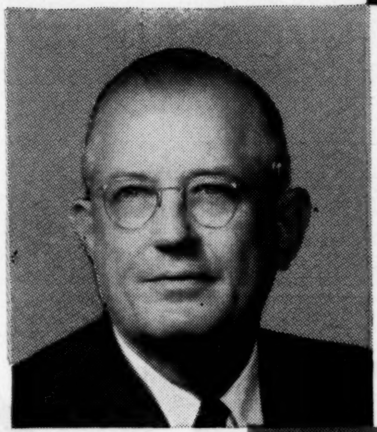

Francis R. Hine
Airwork Corporation, Miami, Fla.


Lester Avnet
Avnet Electronics Corporation,
Westbury, L.I., N.Y.


John W. Busacker
Contact Electronics, Inc.,
Dallas, Texas

Harold H. Powell
Harold H. Powell Co., Philadelphia, Pa.

Robert Avnet
Avnet Corporation, Los Angeles, Calif.

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USAF Contracts

Following is a list of unclassified contracts for $25,000 and over as released by Air Force Contracting Offices:

HEADQUARTERS, ELECTRONIC SYSTEMS DIVISION, AIR FORCE SYSTEMS COMMAND, USAF, LAURENCE G. HANSCOM FIELD, BEDFORD, MASS.

Ewen Knight Corp., E. Natick, Mass., development of single channel and sweep frequency radiometers, job (RFP 123175), AF19(604)-8515, June 12, 1961, $107,524.

The Trustees of Boston College, Chestnut Hill, Mass., investigations of methods for analyzing trace concentrations of impurities in electronic materials, job (RFP 97959), AF19(604)-8819, June 13, 1961, $37,724.

Geophysics Corp. of America, Bedford, Mass., review of requirements and performance of laboratory experiments on nuclear weapon induced infrared chemiluminescent reactions, job (RFP 123681), AF19(604) 8489, June 14, 1961, $49,324.

Airborne Instruments Lab., Cutler-Hammer, Inc., Melville, L. I., studies, including theoretical and experimental investigations of antenna siting, job (RFP 126045), AF19 (604)-8814, June 15, 1961, $37,370.

The Trustees of Columbia University, New York, N. Y., establishment of a five station seismograph network utilizing magnetic tape recording of seismic signals, job (RFP 80649), AF19(604)-8485, June 13, 1961, $292,130.

Stanford Research Institute, Menlo Park, Calif., research on X-ray fluorescence spectroscopy, job (RFP 148219), AF19(604)-8824, June 14, 1961, $46,150.

HEADQUARTERS, AERONAUTICAL SYSTEMS DIVISION, (LMPMGC) WRIGHT-PATTERSON AFB, OHIO.

Bendix Products Division, Bendix Corp., South Bend, Ind., wheel assembly 56 x 16, main type VII, aerno 41-7367. (spares, retrofit for B-52H and G aircraft) amendment No. 1, dated Apr. 7, 1961, to contract AF 33(600)42614, 712 ea., $295,388.

Flight Propulsion Division, General Electric Co., Cincinnati, Ohio, J79-GE11A turbojet aircraft engines with afterburner, iaw/contractor's specification E-716, dated June 21, 1960 and revised September 23, 1960, and amendment No. 1, dated December 28, 1960, (use: installations and spares for F-104G aircraft) and data. Contract AF 33(600)42761, dated Feb. 28, 1961, 52 ea., $9,411,000.

Lockheed Aircraft Service, Inc., Division, Lockheed Aircraft Corp., Ontario, Calif., design, fabricate and test a new recording set, calibration unit and signal data converter. Contract AF 33(600)43057, dated Apr. 27, 1961, $35,000.

The Bendix Corp., Montrose, Pa., transmitter, engine mounted, type MH-5, contractor's P/N 7724-30-B5-1, FSN 6620-789-1638, aerno 61-2479, and data. (Installations for T-38A and depot replenishment spares for FY-61) IFB 33-600-61-207, contract AF 33(600)43064, dated Apr. 28, 1961, 534 ea., $84,874.

Continental Aviation & Engineering Corp., Toledo, Ohio, repair and replacement of facilities (damaged by fire and explosion) at AF plant 27. Supplemental agreement No. 28, dated Apr. 14, 1961, to contract AF 33(600)29914, $31,780.

Flight Propulsion Division, General Electric Co., Cincinnati, Ohio, J79-GE-8 turbojet aircraft engines with afterburner and related data. Supplemental agreement No. 2, dated Dec. 14, 1960, to contract AF 33(600)41716, 16 ea., $3,360,000.

Jack & Heintz, Inc., Cleveland, Ohio, generators, a.c., air turbine motor, aerno 42-0728. (For C-130B aircraft) Supplemental agreement No. 4, dated Apr. 5, 1961, to contract AF 33(600)41912, 37 ea., $50,690.

Lear, Inc., Grand Rapids, Mich., gyroscope, type MD-1, aerno 60-5937. (Usage: Installations and spares for T-39A and F-104A aircraft) Change order No. 4, dated Apr. 25, 1961, to contract AF 33(600) 42332, 139 ea., $151,510.

Aeroflex Laboratories Division, Aeroflex Corp., Long Island City, N. Y., ARX 132

The Lincoln Laboratory program for ballistic missile range measurements and penetration research includes:

EXPERIMENTAL RESEARCH

Measurements and analysis of ICBM flight phenomena for discrimination and for decoy design purposes, including optical, aerodynamic and RF effects.

SYSTEM ANALYSIS

Studies to apply research findings to advance the technology of ICBM and AICBM systems.

INSTRUMENTATION ENGINEERING

Designing radar, optical and telemetry equipment with which to measure ICBM flight effects under actual range conditions.

RADAR SYSTEMS RESEARCH

Extending the theory and application of radar techniques to problems of discrimination, countermeasures and performance in a dense-target environment.

HYPERSONIC AERODYNAMICS

Study of the flow-fields around re-entering bodies for various body designs and flight conditions. Excellent computer facilities available.

RADAR PHYSICS

Theoretical and experimental studies in radar back-scattering. Interaction of RF radiation with plasmas.

A more complete description of the Laboratory's work will be sent to you upon request.

All qualified applicants will receive consideration for employment without regard to race, creed, color or national origin.

Research and Development
LINCOLN LABORATORY
Massachusetts Institute of Technology
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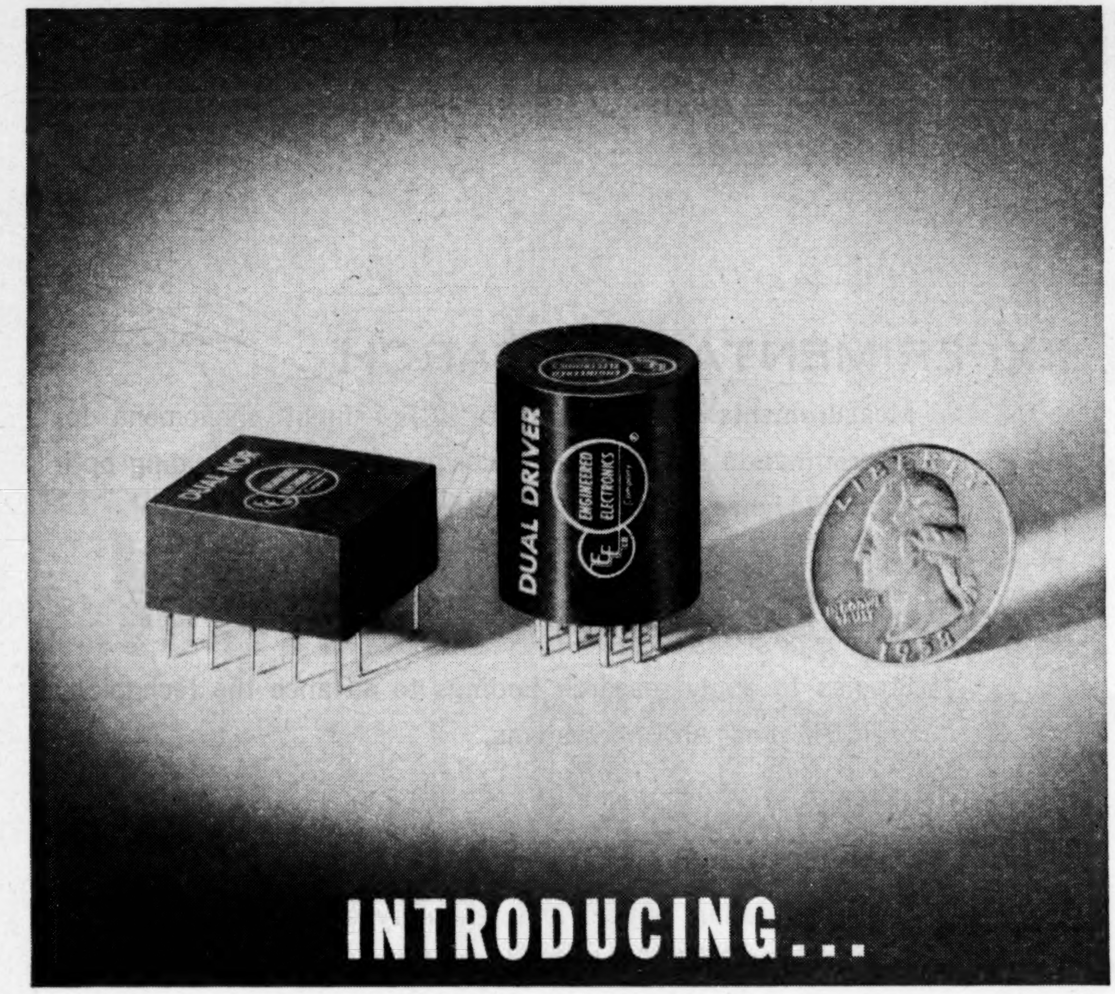

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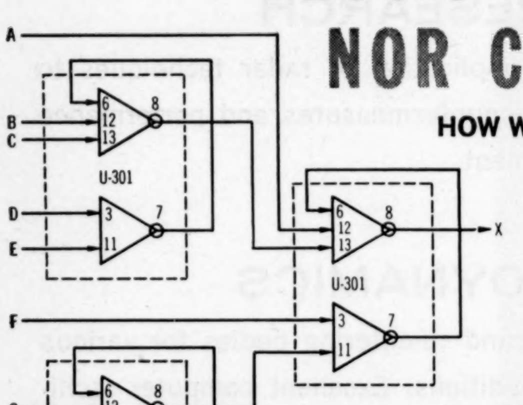

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test sets, spare parts and related data. Contract AF 33(600)42432, dated April 21, 1961, 38 ea., $163,950.

Federal Systems Division, International Business Machines Corp., Rockville, Md., varying quantities of components of bombing navigation system, type AN/ASB-9 and data. (Usage: B-52 aircraft) Contract AF 33(600)42868, dated Mar. 20, 1961, $1,186,594.

Westwood Division, Houston Fearless Corp., Los Angeles, Calif., miscellaneous spare parts applicable to A-9, A-11, 11B and EH-6A processing machines. Contract AF 33(600)42945, dated Mar. 31, 1961, $70,788.

Jack & Heintz, a Division, The Seigler Corp., Cleveland, Ohio, starter-generators, engine, 200 amp., 30 volt, D.C., type STU-6/A, aerno 42-7031, (Installations and spares for YHU-1D and HU-1B Army aircraft.) IFB 33-600-61-176, contract AF 33(600)-43068, dated May 1, 1961, 53 ea., $29,212.

Canadian Commercial Corp., Washington, D. C., components of the radar set, AN/APN-147 and airborne navigation computer, AN/ASN-35, spare parts, aerospace ground equipment and data. Letter contract AF 33(600)43112, dated Apr. 13, 1961, $377,647.

R. A. Miller, Industries, Inc., Grand Haven, Mich., antenna, AT-740/A, FSN 5985-673-5831, Aerno 81-0678. IFB 33-600-61-157, contract AF 33(600)42885, dated May 2, 1961, 1303 ea., $49,514.

Federal Systems Division, International Business Machines Corp., Rockville, Md., varying quantities of components of AN/ASB-9 bombing navigational system. (Used on B-52 aircraft) Amendment No. 1, dated Mar. 21, 1961, to contract AF 33(600)42805, $124,869.

Federal Systems Division, International Business Machines Corp., Rockville, Md., computer, terrain clearance, contractor's P/N 6336000, FSC 1280-779-3167, Aerno 64-0774. Amendment No. 1, dated March 24, 1961, to letter contract AF 33(600)42804, 174 ea., $901,076.

Navy Contracts

Following is a list of unclassified contracts $25,000 and over as released by the Aviation Supply Office, U. S. Navy.

General Electric Co., Lynn, Mass., analytical analysis of the characteristics of the thin lubricant film under dynamic conditions, $44,224.

General Electric Co., Lynn, Mass., analytical study, with appropriate experimental work, of shipboard propulsion and auxiliary systems, $174,952.

Aplens, Associated des Amis Laboratorire de Physique de l'Eclose Normale Superieure, Paris, France, investigations on the transmission of high frequency radio energy over long distance; also phenomena of energy backscatter will be studied, $45,000.

Reaction Motors Division, Thiokol Chemical Corp., Denville, N. J., investigation and determination of the performance of new liquid monopropellants, $60,000.

OFFICE OF NAVAL RESEARCH, WASHINGTON, D. C.

International Business Machines Corp., Yorktown Heights, N. Y., research in the mathematics of superconductivity, $29,792.

AeroChem Research Laboratories, Princeton, N. J., research in oscillatory burning, $47,861.

American Institute for Research, Washington, D. C., Research on the comparison of Navy enlistees with American youth in general, $30,976.

Thiokol Chemical Corp., Elkton, Md., research to develop instrumentation for the measuring of the acoustic impedance of a burning solid propellant, $56,490.

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio, research on an electrolytic gas reactor system for submarines, $29,972.

Rias Division, The Martin Co., Baltimore, Md., theoretical research on the chemistry of boron, $33,534.

Materials Technology, Inc., Natick, Mass., research in ultrasound microscopy, $36,500.

SAFETY

CAB Accident Investigation Report—Part II:

Learstar Crash Prompts Deicing Restudy

(This is the conclusion of a Civil Aeronautics Board accident investigation report on the crash during a snowstorm of a Johnson and Johnson, Inc., Learstar near Woonsocket, R.I., on Dec. 15, 1958. The first part of the report, which appeared in Aviation Week *Sept. 11, p. 105, described how the Learstar took off from Linden Airport, N.J., for what was planned to be a nonstop flight to Logan Airport at Boston, Mass. En route the pilot advised that the right engine was inoperative, the propeller feathered, and declared an emergency. Approximately 11 min. later the aircraft crashed—Ed.)*

Available meteorological data indicated that the temperature on the route at flight level from Linden, N. J., to the accident site ranged from −8C to −10C through Connecticut and from about −3C to −5C through Rhode Island and eastern Massachusetts, and that the air was very near saturation. The freezing level from northern New Jersey to New England was at the surface except in the vicinity of Nantucket, where it was at 1,600 ft.

Winds Aloft

Winds aloft measured at 0700 by U. S. Weather Bureau stations at Idlewild and Nantucket show that at 5,000 ft. the winds at Idlewild were from 220 deg. at 18 kt. backing to 190 deg., 17 kt., over Nantucket. At 4,000 ft. the winds were from 230 deg., 17 kt., over Idlewild backing to 130 deg. at 15 kt. over Nantucket.

At 0855 the Weather Bureau filed the following inflight icing reports for teletype transmission by the FAA:

A Convair over Greenfield, Massachusetts, reported picking up ice at 6,000 ft. at 0846.

A Convair reported picking up a moderate to heavy load of ice between Providence and Bradley between 0800 and 0830 at 6,000 ft. and climbed to 9,000 ft. to get out of it. The aircraft still had three to four inches of ice after landing at La Guardia.

At 0910 the following reports were filed for transmission: Between 0730 and 0800 a Convair reported both rime and clear ice from 6,000 ft. on up between Westboro and Albany. A DC-6 over Hartford at 0841 reported light icing from 6,000 ft. on up.

The U. S. Weather Bureau forecast for northeastern New York, New England, and the coastal waters prepared by the Boston Office and valid from 0800 to 2000 called in part for layered clouds from 2,500 to 18,000 ft., with intermittent light snow and conditions variable to ceilings of 600 to 1,000 ft., visibilities 1 to 2 mi. in snow. The freezing level was expected to be at or near the surface and light icing was anticipated in the clouds.

For the period from 0600-1600 the Boston terminal was forecast to be: "Ceiling 3,000 ft. overcast, visibility 7 mi. occasionally ceiling 2,000 ft., sky obscured, visibility 3 mi., light snow." At 0720 this was amended by a forecast indicating conditions occasionally "Ceiling 1,200 ft., sky obscured, visibility 1½ mi., light snow till 15E."

Amended Forecast

At 0940 the Boston terminal forecast, again amended for the period until noon, called for: "Ceiling 600 ft., sky obscured, visibility ¾ mi., light snow, wind north-northwest 12 kt., variable to ceiling 100 ft., sky obscured, visibility ¼ mi., moderate snow."

The Weather Bureau office at Boston issued a flash advisory at 0350 valid till 0750 indicating: "Northeastern New York, Vermont, southern New England, southern coastal waters ceilings occasionally below 1,000 ft., visibility occasionally below 3 mi. These conditions gradually spreading through New Hampshire."

The Weather Bureau office at Idlewild issued a flash advisory at 0400 valid till 0800 indicating "patches of stratus with ceilings occasionally below 1,000 ft., over southeastern New York, New Jersey and the coastal waters."

At 0740 the Boston office issued another flash advisory for New England, northeastern New York, and the coastal waters calling for "Ceilings frequently below 1,000 ft., visibility frequently below 3 mi. Valid till 1150E."

The Idlewild office at 0830 issued another flash advisory indicating: "Ceilings below 1,000 ft., visibilities variable to below 1 mi. in light snow eastern end of Long Island and eastern coastal water. Valid till 1130E."

The aircraft flight log for this flight was recovered from the wreckage, and although damaged indicated that the true airspeed was 215 kt. and the ground speed from Poughkeepsie to Hartford was 240 kt. The log also indicated that the crew had received the 0900 Boston weather, and that the indicated outside air temperature had increased to −2C.

Analysis

The examination of the structures and powerplants of N 37500 revealed no evidence of inflight failure, or malfunction of the aircraft, or of its systems or components. It was evident that the No. 2 engine was not turning at impact and its propeller was feathered. The No. 1 engine was rotating at impact and its propeller was not feathered.

Examination of both engines revealed no evidence of any inflight failure or malfunction. Both left and right engine carburetor heat doors were in the "full hot" position.

At the flight altitude of 5,000 ft. the aircraft would have been on instruments commencing in western Connecticut and would have remained on instruments during the remainder of the flight. During that portion of the flight from central or eastern Connecticut to the crash site moderate to heavy snow would have been encountered. Available meteorological data indicate that the temperature at flight altitude would have been in the −10C to −8C range through Connecticut, and in the −5C to −3C range through Rhode Island. The latter range of temperature is considered particularly favorable for ice formation. The data also reveal that temperatures were at or below freezing at all levels over most of southern New England and that the air was near saturation at flight altitude. With such a combination of temperature and moisture the aircraft would have encounterd heavy icing conditions from eastern Connecticut to Rhode Island.

Deficiency Cited

Icing of this magnitude was not anticipated in the pertinent U. S. Weather Bureau forecasts, nor was it anticipated by the National Weather Forecasting Corp., whose chief meteorologist briefed the pilot prior to departure. The failure to adequately predict the intensity of icing conditions was a deficiency on the part of the forecasters concerned at both the U. S. Weather Bureau Airport Station at Boston and the National Weather Forecasting Corp. at Newark.

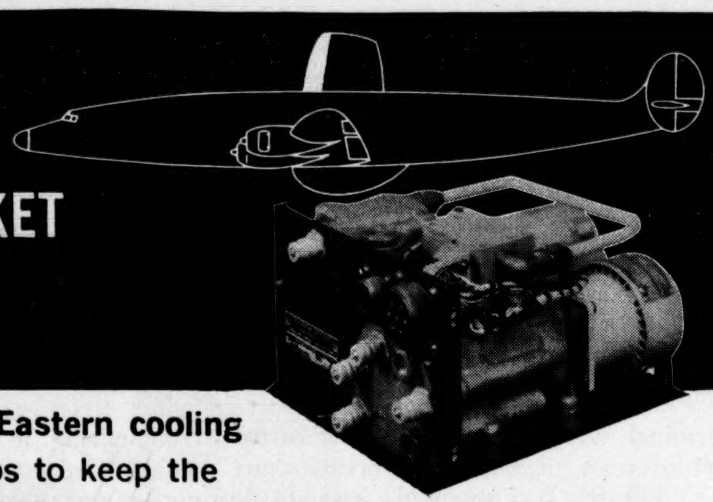
The pattern of three hourly pressure falls along the coast, warming aloft indicated by snow grains and snow pellets reported at various southern New England stations, as well as rapidly deteriorating ceilings and visibilities should have alerted both the Weather Bureau and the private forecasting firm to the likelihood that the low pressure center was intensifying and moving northward more rapidly than was anticipated and that the center was nearer to the coast than indicated on the early morning charts.

Weather Bureau forecasts, particularly the flash advisories, including those issued before Capt. Sable's departure, did warn of ceilings below 1,000 ft. and visibilities below 3 mi in snow over New England. Nevertheless, these advisories were not brought to the captain's attention by the National Weather Forecasting Corp. and the failure to do so also represents a deficiency in the briefing service provided.

While these flash advisories did call attention to low ceilings and visibilities, there was no mention of moderate or heavy icing conditions even though these conditions were reported by pilots prior to 0900 and did meet the criteria for issuance of, or inclusion in, a flash advisory.

At 0720 the Weather Bureau Office at Boston issued an amended forecast for Bos-

ABOARD A RADAR PICKET PLANE



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X
XYZ
XYZXYZ
ZYXYZYXYZ
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If X + Y + Z = 1, prove XY + YZ + XZ < ½

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ton, Providence, and other terminals reflecting a more rapid deterioration of conditions than originally anticipated and at 0940 again amended a considerable number of forecasts for terminals within its area of responsibility.

The National Weather Forecasting Corp. made no effort to contact Capt. Sable prior to takeoff with weather information additional to that given in his briefing despite the fact that before 0800 and within just a few minutes after 0800 there were available by teletype numerous indications of deteriorating conditions which were especially significant owing to the known presence of the northward moving low pressure system off the coast.

Reporting Point

The flight operated routinely over the assigned airways until it reached the vicinity of the Sterling Intersection. This reporting point is located at the junction of Victor 167 and Victor 16 Airways, and is approximately 53 naut. mi. southwest of the flight's destination, Boston, Mass.

The aircraft flight log showed a true airspeed of 215 kt. and a ground speed of 240 kt., indicating an effective 25 kt. tailwind. Applying the ground speed of 240 kt. that also resulted from a study of the flight's en route progress between Poughkeepsie VOR and Hartford VOR, the aircraft was some 6 min., or approximately 24 naut. mi., past Hartford VOR and 11 mi. from the Sterling Intersection at 0919 when the flight attempted to establish contact with the Boston Center, on the assigned frequency.

Upon initial contact with the Center, there was difficulty in establishing communications. The Boston Center controller, responsible for controlling traffic in the sector being traversed by N 37500, stated that the communication frequency was overloaded at the time because of the heavy traffic. At approximately 0920 communication was established and the flight reported that it had lost power on the right engine and was declaring an emergency. The flight at this time was approximately 8 naut. mi. from the Sterling Intersection and some 61 naut. mi. via airways from Logan Airport at Boston.

Capt. Sable was well qualified in the Learstar and had acquired a considerable amount of instrument experience. In addition to his pilot ratings, he also possessed a mechanic's certificate with airframe and powerplant ratings, and a ground instructor's (powerplants) certificate. He was aware of the company procedures for the use of carburetor air preheat and carburetor alcohol, which were substantially in accord with the recommendations of both the engine and aircraft manufacturer.

Carburetor Preheat

It is reasonable to asume that the crew was utilizing carburetor air preheat to prevent induction icing from the vicinity of Poughkeepsie, since it was in this area that the overcast and associated precipitation would be entered. It is not possible to state whether the pilot had any appreciable advance warning of severe induction icing difficulties since power loss from induction icing can occur virtually instantaneously, or may be progressive over a period of time depending on the atmospheric conditions encountered and the type of carburetor icing being experienced. In this connection it should be noted that induction system icing, while utilizing partial carburetor air preheat, was not uncommon in the Learstar. The chief pilot for Johnson and Johnson stated that this was a situation that had been previously encountered, and was the reason for the detailed procedures for the use of carburetor alcohol if carburetor icing was experienced while utilizing preventive preheat.

He further stated that while they considered the heat rise inadequate, and had made several modifications to the carburetor air inlet system to overcome this supposed deficiency, they had never considered the lack of heat rise to be critical since the aircraft was also equipped with carburetor alcohol. Carburetor alcohol was not a required item under the certification of this aircraft, but when incorporated in the system provides an additional means of eliminating carburetor and carburetor screen ice.

The procedures used by the crew of N 37500 had been adequate in previous encounters with carburetor icing conditions, and up to the point of failure the crew would have little reason to believe that they would not be effective in this instance. The use or non-use of the alcohol system, or whether it did or did not function could not be determined, since the solenoid valves return to the "closed" position when de-energized.

Upon failure of the right engine to produce power, the pilot was faced with the decision of continuing to Boston in accordance with his flight plan, or selecting a suitable alternate airport. He chose to continue to Boston. In making the decision he would consider, among other factors, the icing conditions he had just passed through, the icing condition he was in, and the probable icing conditions ahead. The severity of the carburetor icing conditions ahead were unknown to the pilot. However, to reverse course, in order to proceed to an area to the west would require that the flight return through or remain in known icing conditions which had produced failure of one engine. At reduced speed on single engine and faced with an apparent 25 kt. headwind, the aircraft would remain in this area of icing conditions for a period of time approximately twice as long as had been sufficient to produce failure of the right engine.

Pilot's Estimate

A rapid estimate by the pilot of the time to continue to Boston, as compared to proceeding to another suitable airport, would indicate that there was little choice. (Logan Airport is served by an ILS, has radar service, and the approach could be made straight into a 10,000-ft. runway.) The flight log showed that the flight was in receipt of the 0900 Boston weather which was 1,000 overcast, ½ mi. visibility in light snow and smoke. This information had been secured within a matter of minutes before the pilot declared his emergency. Upon declaring the emergency and stating his desires, he was cleared by Boston ARTCC direct to the Boston ILS outer marker and advised, "We'll have a further altitude for you shortly." In view of the short time the pilot had in which to assess the various factors, the Board believes that there is little basis upon which to criticize the pilot for his decision to continue to Boston.

Assuming that the ground speed was considerably less after the power loss of the right engine, it is logical to conclude that the flight was proceeding in a northeasterly direction on course from Sterling Intersection, and was approximately 10 naut. mi. northeast of Sterling at 0926 when the crew reported intermittent power loss on the left engine. The flight continued on course for approximately another 8 mi. where it crashed.

There is no doubt that the right engine ceased to develop power and the propeller was feathered. Subsequent to the shutdown of the right engine, the crew advised of power loss on the left engine, and intermittent operation of this engine is confirmed by several ground witnesses. There was no physical failure of the engines, propellers, or accessories. Both carburetor air heat doors were found in the "full hot" position. The facts indicate induction system icing, and it is concluded that this was the cause of failure of both engines to produce power.

As previously stated, new evidence which came to light after issuance of the Board's report on Sept. 11, 1959, indicated that considerable stratification existed in the Learstar carburetor air induction system. While stratification is not a new problem, and exists to some degree in most large aircraft engines, subsequent official tests conducted by the Federal Aviation Agency showed that the degree of stratification in the Learstar carburetor air induction system was unacceptable.

Temperature Control

The controllability of carburetor air temperature (CAT) in order to prevent carburetor icing in the Learstar is accomplished by maintaining a temperature of up to 38C on the cockpit carburetor air temperature instrument. A maximum limit of 38C for continuous operation is specified by the engine manufacturer. "Continuous operation" is defined by one major aircraft manufacturer as being not over 30 sec.[6] If this temperature is exceeded, detonation may occur which can lead to rapid failure of the engine.[7] There is no indication in the cockpit of the carburetor air heat door position on Learstar. The indicated CAT is the only information available to the

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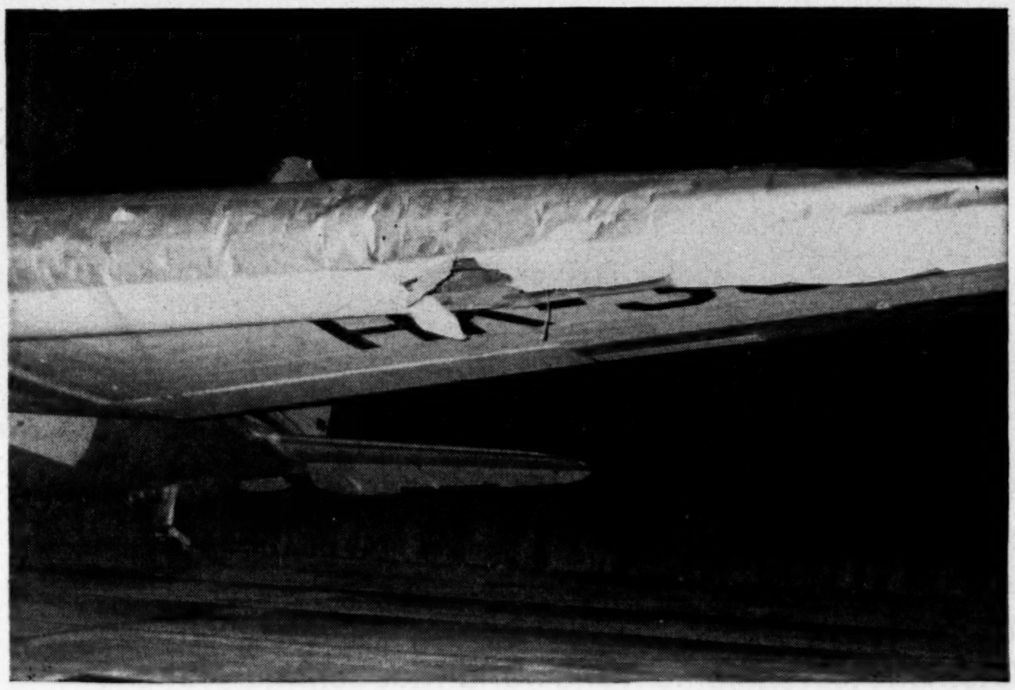
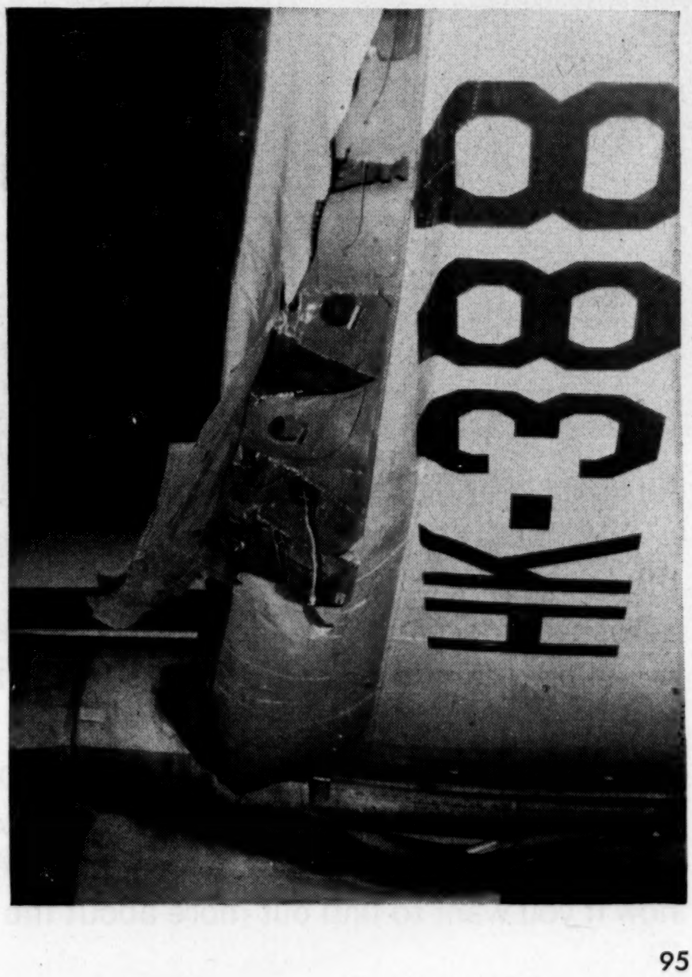
[6] Field Engineering Technical Report TCI No. 35, Wright Aeronautical Division, Curtiss Wright Corp.

[7] Technical Information Bulletin, Bureau of Safety Investigation, Civil Aeronautics Board, dated Jan. 17, 1952.





Fuel Vapor Ignites in C-46

Fuel vapor in the leading edge areas of the left wing exploded when the No. 1 engine of a C-46 transport owned and operated by SAM, a Colombian airline, was started. Accident occurred recently at Tocumen Airport, Panama. It was reported that no fire occurred after the explosion.

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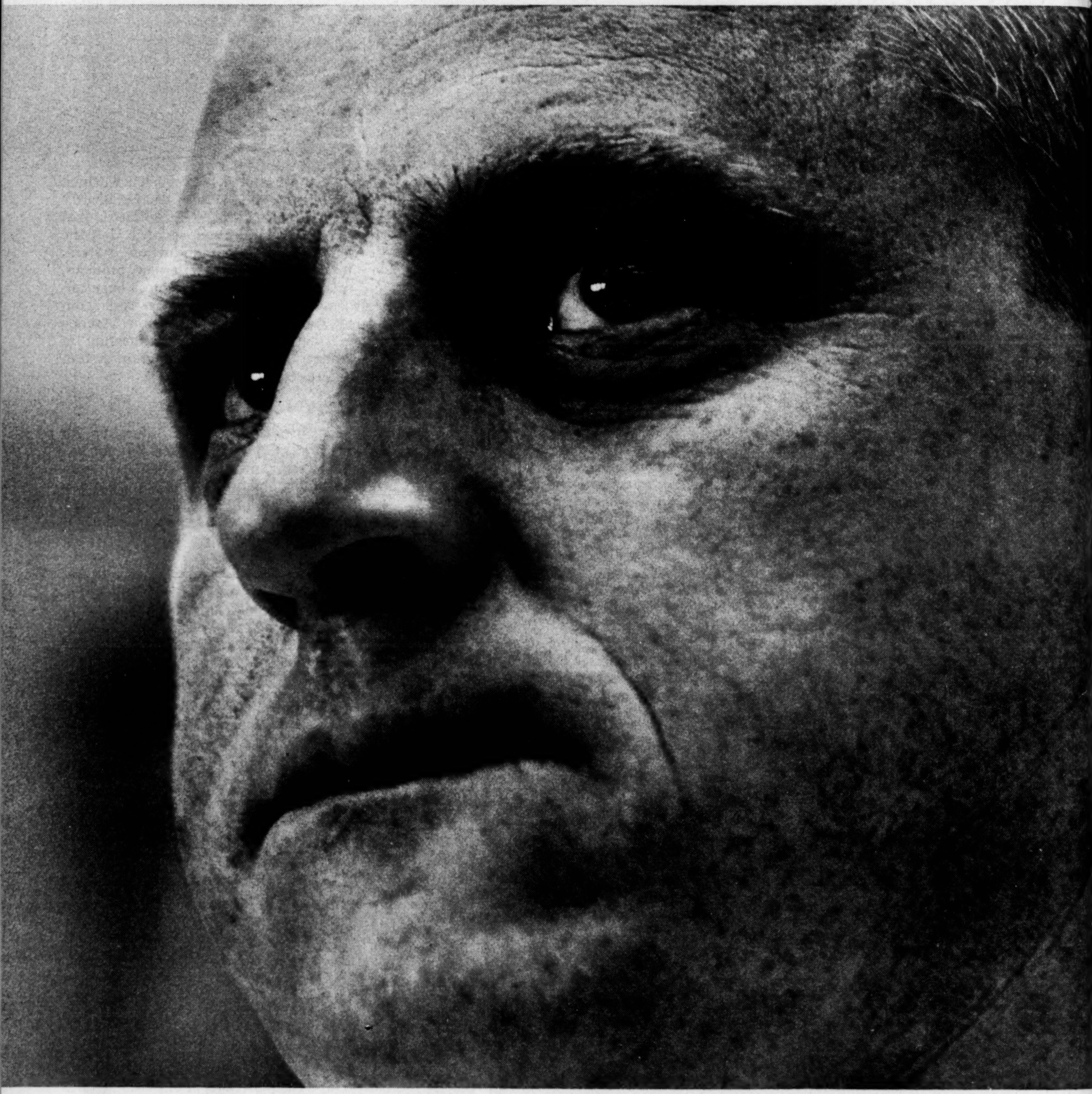

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pilot. This results in a partially open/closed door position, which under the official and unofficial tests conducted on the Learstar indicated that carburetor icing could occur with indicated carburetor air temperatures of 38C.

Ice accumulation in the impact tubes and automatic mixture control needle will cause leanness of the fuel mixture. This generally will occur at near or below freezing temperatures over quite a wide range of temperatures with atmospheric ice or snow. Snow can collect around the automatic mixture control needle and screen under conditions where icing is not normally suspected. Its location requires a fairly high heat rise for a prolonged period of time in order to bring casting temperatures above freezing. Alcohol is relatively ineffective in removing this type of accumulation.[8] When power loss is experienced, the heat necessary is not available.

The problem will be further aggravated if ice which has accumulated in dead areas in the duct or behind the heater doors is released by movement of the heater doors, or by a temperature rise in the air inlet duct. The block of snow or ice thus released may break loose and move to a position where it can seriously restrict air flow to the engine. The resulting loss of power reduces still further the heat available for curative purposes, and can lead to complete power loss.

It should be noted that the aircraft log shows an outside air temperature rise from −10C in the vicinity of Poughkeepsie to −2C at Sterling. When this outside air temperature rise is coupled with the free temperature rise of 24.6F in the carburetor air inlet duct (as determined during type certification tests), the release of duct ice becomes a distinct possibility in contributing to the failure of the engines on N 37500.

The Board concludes that there was no mechanical inflight failure or malfunction of the aircraft, its powerplants, or equipment. While operating with a partially opened heat rise door in order not to exceed the engine manufacturer's limit of 38C heat rise, a highly stratified flow of air through the carburetor air inlet system resulted. This, in effect, nullified the attempts of the crew to carry adequate inlet air preheat in order to prevent induction system icing.

Since the accident the Weather Bureau has taken the following action:

A Weather Bureau-FAA cooperative PIREP (pilot report) program was started in January, 1960. Three new positions were established at each aviation forecast center to assist in flash advisory and related aviation forecasting work.

Attempts are being made to develop effective procedures for assuring positive notification to IFR flights of pertinent flash advisory information.

The Board, on Jan. 7, 1959, recommended to the Federal Aviation Agency that the adequacy of the carburetor induction heat system of this aircraft be reevaluated and more specific instructions regarding its use be provided. The FAA subsequently advised that portions of the flight manual pertaining to deicing procedures were to be clarified. They also advised that an alternate fuel source arrangement had been certificated which would enable engines to operate even though the carburetor boost venturi and impact tubes were iced over. The FAA, however, did not propose to make this a mandatory modification since the information available to them indicated that the Learstar had sufficient carburetor anti-icing and deicing provisions if proper operating techniques were employed.

On Jan. 16, 1960, the Board forwarded to the Administrator new information indicating the presence of severe carburetor air induction system stratification in the Learstar aircraft and recommended that the Administrator conduct further evaluation of the Learstar induction heat system.

As a result of additional testing, the Federal Aviation Agency issued an airworthiness directive applicable to all Lockheed Model 18 aircraft which have been converted to the Learstar configuration. The airworthiness directive restricts such aircraft against flying into known icing conditions until the carburetor air preheat system has been modified and appropriate revisions to the Learstar Flight Manual have been accomplished. This modification results in a more accurate carburetor air temperature indication for the prevention of ice formation on the carburetor screen and engine induction system at all preheat positions. Such modification will also permit operation with preheat under varying power and ambient temperature conditions without resulting in excessive carburetor air temperature.

The Board determines that the probable cause of this accident was the failure of the anti-icing and deicing systems to prevent and remove carburetor ice under the atmospheric conditions encountered.

By the Civil Aeronautics Board:

ALAN S. BOYD, Chairman; CHAN GURNEY, Vice Chairman; G. JOSEPH MINETTI, Member; WHITNEY GILLILLAND, Member; J. S. BRAGDON, Member.

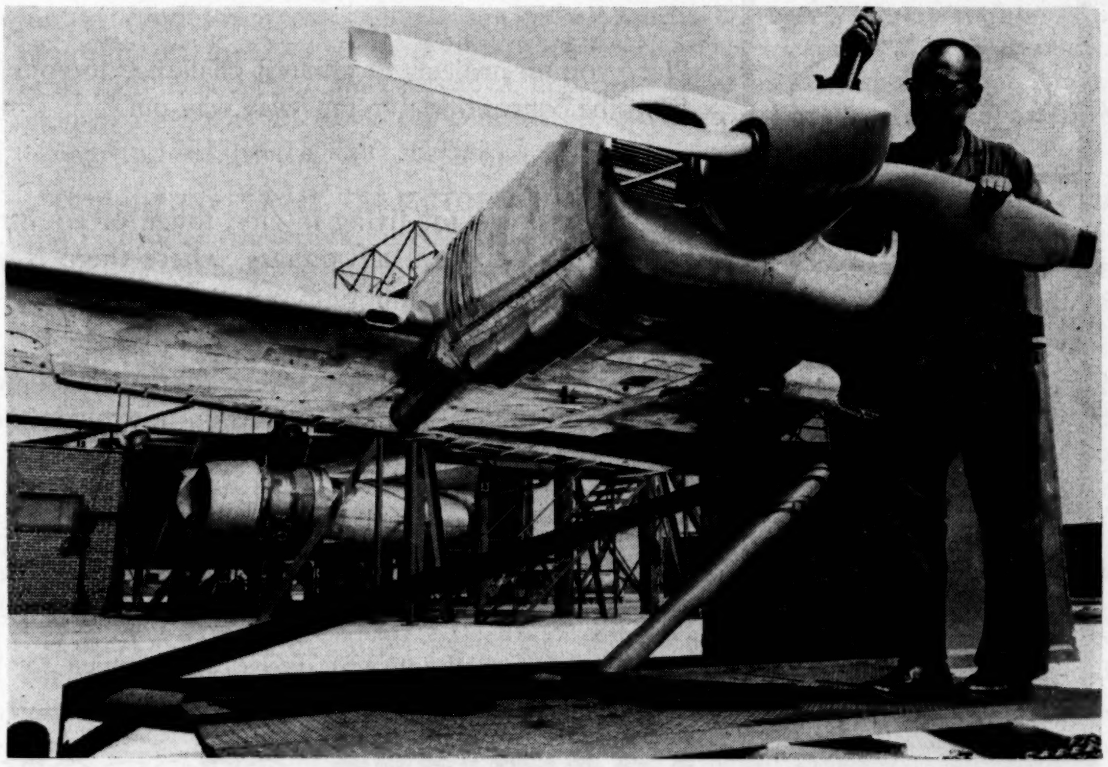
Johnson and Johnson, the owner of the aircraft, is a private corporation with its main office at 500 George Street, New Brunswick, N. J.

Capt. Alex S. Sable, age 38, held a currently effective airman certificate with airline transport and flight instructor ratings. He also held a ground instructor (powerplants) certificate and a mechanic certificate with airframe and powerplant ratings. He had been employed by Johnson and Johnson since Nov. 13, 1953. His total time was 5,877 hr., of which 503 hr. were in Lockheed N 37500. His first-class physical, without limitations, was dated July 11, 1958, and he had completed a line and instrument check on May 26, 1958.

Copilot Edward F. Luidvinaitus, age 35, held an airman certificate with commercial privileges, single and multi-engine land, and instrument ratings. He had been employed by Johnson and Johnson since July 11, 1958. His total pilot time was 1,798 hr., of which 145 hr. were in Lockheed L-18 type aircraft. His first-class physical, without limitations, was dated July 11, 1958.

Lockheed Learstar, N 37500, was manufactured by the Lockheed Aircraft Corp. Oct. 13, 1942, as a Lodestar Model 18, serial No. 2251. It was remanufactured as a Learstar by Lear, Inc., June 1, 1955. At the time of the accident Pac Aero Engineering Co, held the manufacturing rights of the Learstar aircraft. The aircraft had a total time of 5,258 hr., 1,706 of which were since its conversion to a Learstar.

It was equipped with two Wright Model 1820-76B engines and Hamilton Standard Model 33D50-135 propellers with model 6511-A-12S blades. The left engine had 606 hr. since overhaul and the right engine had 364 hr. since overhaul.



Cessna 310 Test Stand Aids B-52H Test

Ground testing of the crosswind characteristics of the Pratt & Whitney TF-33 turbofan engines powering the Boeing-Wichita B-52H Stratofortress is aided by a Cessna 310 wing and engine mounted on a mobile test stand. Boeing borrowed the stand from Cessna to provide 50-60 kt. wind velocities at the turbofan inlet. Cessna stand is mounted at right angles to the turbofan inlet (rear) and approximately 30 ft. away. System provides more accurate data than did previous tests using B-52H and C-97.

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[8] Aircraft Carburetor Service Bulletin No. 720, Bendix Aviation Corp.

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WHO'S WHERE

(*Continued from page 23*)

Changes

F. M. Fulton, director of the newly formed Applied Science Division, Santa Paula, Calif., of Hycon Mfg. Co.

Stanley A. Cory, senior engineer, Motor Division, Hydro-Aire Co., Burbank, Calif., a division of Crane Co.

James W. Bryan, West Coast area manager for Beech Aircraft Corp.'s Aerospace Division, with headquarters in Los Angeles, Calif.

R. E. Whiffen, general manager, Bendix Products-Aircraft Division of The Bendix Corp., South Bend, Ind. **Roy J. Sandstrom** succeeds Mr. Whiffen as assistant general manager of the Bendix Mishawaka, Ind., Division, and **Louis B. Young** succeeds Mr. Sandstrom as general manager of the Bendix Systems Division, Ann Arbor, Mich.

Hugh Mease, Jr., head of the newly established Business Development Planning organization in the Systems Operation of General Electric Co.'s Heavy Military Electronics Department, Syracuse, N.Y.

Dr. William J. Perry, director, Electronic Defense Laboratories, Sylvania Electric Products, Inc., Mountain View, Calif., and **Frank E. Butterfield,** chief engineer.

Richard F. Post, head, Military and Industrial Products Department, Aircraft Radio Corp., Boonton, N. J.

Paul E. Henninger, Sr., manufacturing manager and assistant to the president, Kellett Aircraft Corp., Willow Grove, Pa.

Henry A. Samulon, associate director, Electronics Division, Space Technology Laboratories, Inc., Los Angeles, Calif. **Dr. Joseph F. Shea** succeeds Mr. Samulon as director of the technical team heading STL participation in the Bambi program. Also: **Donald B. West,** associate head, Antenna and Microwave Section, a division of the STL Communications Laboratory.

Robert J. Segal, manager, Design Engineering for Combat Logistics Network, Radio Corporation of America, New York, N.Y.

Roy J. Jablonsky, manager, Servo Component Division of Giannini Controls Corp., Glendale, Calif.

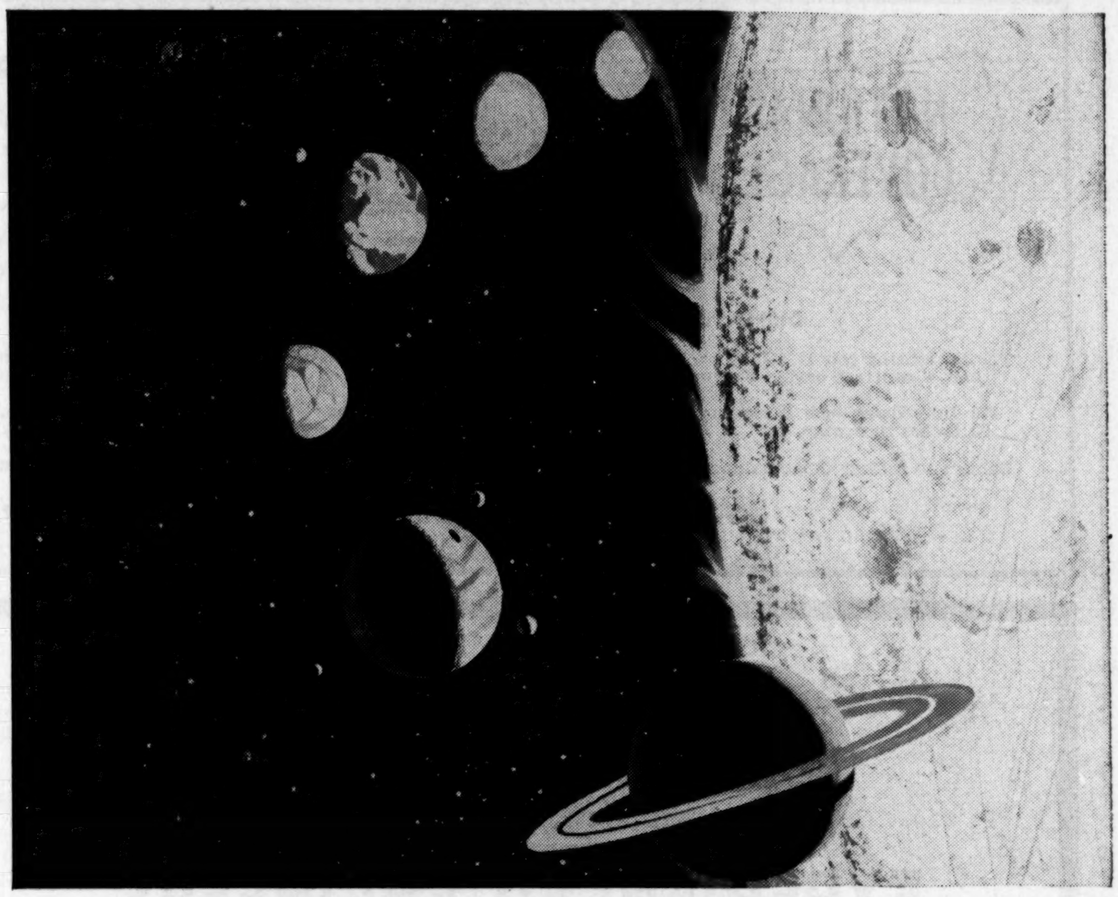
Electronic Systems and Equipment Department of Northrop Corp.'s Nortronics Division, Hawthorne, Calif., has appointed the following marketing specialists: **Donald C. Cardiff** for astro-inertial guidance systems; **Kenneth J. Shroll** for data acquisition, computer and ground support equipment; **Donald L. Driscoll** for subcontract manufacturing capabilities; **Albert G. Strachan** for aerospace sensing devices and space electronics studies.

Robert E. Gaffney, manager-systems marketing, General Electric Co.'s Light Military Electronics Department, Utica, N. Y.

W. B. Anderson, assistant chief engineer, Boeing Industrial Products Division, Seattle, Wash.

Rudolph Furrer, special assistant-reliability, Lockheed Missiles & Space Co., Sunnyvale, Calif.

Dr. Guy Black, staff engineering specialist-development planning, Sylvania Electronic Systems, a division of Sylvania Electric Products, Inc., Waltham, Mass.



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LETTERS

Aviation Week welcomes the opinions of its readers on the issues raised in the magazine's editorial columns. Address letters to the Editor, Aviation Week, 330 W. 42nd St., New York 36, N. Y. Try to keep letters under 500 words and give a genuine identification. We will not print anonymous letters, but names of writers will be withheld on request.

Pro . . .

I read your "Laying It on the Line" (AW July 31, p. 17) and feel compelled to congratulate you on your courage to describe the Germans as you did. You are absolutely right—all that they regret is the fact that they lost World War II. There is no shame or remorse for killing and mass murder (except by isolated individuals deserving the highest praise).

If this is the feeling of the British and French, did anyone ever stop to think what the emotional impact of rearming Germany is on Poland, Czechoslovakia, Yugoslavia, and on the common people of Russia? In the flood of publicity on the mass murder of Jews, it seems to be forgotten that practically all Gypsies were eradicated, millions of Poles, millions of Russians. Go to Holland, Belgium, Denmark, Norway, Greece, and ask them whether German atrocities are forgotten?

What are we going to do about this problem? Radio Free Europe? So much wasted money. The news about the German atom bomb nullifies and destroys all good that Radio Free Europe may do.

What is it that the West can offer the people under Russian occupation which will guarantee that it will not be the Germans who are going to "liberate" them?

As long as this question is not cleared, they will choose the lesser evil of Russian occupation. This means 100 million population—white, creative, population—permanently welded to Russia.

You are indeed brave to raise this issue, when the West is looking to the Germans to do the fighting. This is a bad start—and thank God there are people like you who know it and dare to write about it.

Helicopter Engineer
(Name withheld by request because firm does business in West Germany.)

. . . Con

In your editorial "Laying It on the Line" you make reference to " . . . the horrors inflicted on that continent by the Germans . . ." This is most certainly true, and deeply regretted by any decent German. In the same vein you could refer, and many Europeans close to the scene do, to the "mistake" committed when President Roosevelt delivered all of eastern Europe into Red slavery. This act of a U. S. President still has its everyday victims.

I suggest that we all learn out of the mistakes of the past, stand together and build a better world free of hate. Your article's references against Germany, unfortunately, indicate that you are not one of the potential builders of this better world which President Kennedy called all free mankind up to defend. Your statement about Germany's U. S.-financed prosperity and growing military strength built to avoid defeat reveals a surprising degree of misjudgment. Their strength is, in NATO, our strength. Their prosperity the prosperity of a free nation in the Atlantic community. And it was achieved by the nation which got the smallest U. S. assistance of all major European nations. And they paid back, even in advance.

I am a former German, now a U. S. citizen. And I am proud to be a U. S. citizen, particularly since I know that people like you are a rare exception in this country.

I will call your infamous insult of the German nation to the attention of the State Department and the German Embassy in Washington, D. C.

It is time that people like you, warped with hate, the grave diggers of humanity, are stopped. I suppose this can be best done by McGraw-Hill Publishing Co., and I will enclose this protest note in a letter to the President of McGraw-Hill with an appropriate request.

F. W. Krohn
Del Mar, Calif.

Orbited Cosmonauts

In the Aug. 14 issue of Aviation Week (p. 31) there is a two-page article on the latest Soviet orbiting of a Russian cosmonaut in Vostok II. Although I am 90% convinced myself that these last two flights have taken place with men on board the satellites, William Buckley in the latest National Review mentioned that there was a quote in the New York Times of Titov concerning the fact that his "couch" was not a "pillow of down." Supposedly he was sleeping in a weightless condition. The emphasis in Buckley's article is that the couch was pressing against him or he against it—Buckley's suggestion being that perhaps this is the talk of an entirely earthbound human being and that perhaps Titov never was airborne at all.

My question is, was there any direct communication of a voice nature which could be pinpointed as coming from the latest orbiting vehicle by any communications centers in the Western world? Are we strictly relying on Soviet sources for information concerning Mr. Titov? In the article in Aviation Week I did not see any reference to the fact that there was any pickup of voice communication from Titov while he was in orbit.

I have been a subscriber to Aviation Week for several years and find it most valuable in my work.

Sam H. Husbands
Dean Witter & Co.
Investment Bankers
San Francisco, Calif.

(U. S. intelligence agencies took tapes of Maj. Titov's voice transmissions during the Vostok II flight, and National Aeronautics and Space Administration tracked the Vostok. U. S. government is satisfied that USSR has in fact orbited two cosmonauts.—Ed.)

Precipitation Radar

This is in regard to your brief article in the Airline Observer column of the Aug. 21 issue of Aviation Week and Space Technology (p. 49) which describes a "Radar bright display and scan conversion system . . ." scheduled for the New York area. We thought perhaps your readers would like some further information. Also, we believe that some of the statements made regarding the capability of the equipment are not entirely accurate and we noticed that the master radar is not mentioned. The article refers to a microwave link purchased and operated by the U.S. Department of Commerce Weather Bureau which will provide a remote display of the Bureau's WSR-57 weather surveillance radar located on the roof of the RCA building, Rockefeller Center. This was commissioned on Mar. 6, 1961, and is a vital link in the Bureau's network of 31 long-range radars operating as of Sept. 1, 1961, along the hurricane-vulnerable Atlantic and Gulf coasts through "tornado alley" and at other strategic locations.

The WSR-57 radar was built by the Raytheon Co. to Weather Bureau specifications and displays precipitation phenomena such as rain, snow and hail up to a maximum range of 250 naut. mi. However, the radar displays only those clouds with precipitation-size droplets and hence is not used to measure ceiling and visibility. It will not detect all "general weather conditions" such as fog and low temperatures, nor will it directly measure the wind speed and direction. It is a very effective tool for detecting and tracking hurricanes and tornadoes and other severe weather. It can provide weather information such as the location, extent, intensity and speed and direction of movement of a line of thunderstorms to aviation interests and it is also useful in local short-range forecasting hydrology and meteorological research. We hope that this information will be helpful and if we can be of any further assistance please let us know.

A. K. Showalter, Chief
Observations & Station Facilities Division
U. S. Weather Bureau
Washington, D. C.

Projected Image

Your editorial of Aug. 28 on the drive for establishment of a U. S. Disarmament Agency for World Peace and Security again brings up the subject of our "image" abroad. With the awareness that many people, foreign as well as American, believe "actions speak louder than words," I submit that the ratio of $47.5 billion authorized for Fiscal 1962's U. S. military (armament) budget to the proposed $6-million annual budget for the U. S. Disarmament Agency—nearly 8,000:1—might speak volumes to the world's peoples about our sincere interest in disarmament. Until we embark on a "crash program" to drive that ratio toward 1:1, and beyond, we can expect from people abroad more "misunderstandings" of our intentions.

William C. Bohn
New York, N. Y.